University of Alberta

Characteristics of Successful Technology Mentoring Programs

by

Joni Turville

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CHAPTER I: INTRODUCTION

Background

Technology is becoming increasingly prevalent in our society. In many ways it has changed the way we access, gather, organize, and process information in our daily lives (Dooley, 1999). The increasing amounts of information accessed and daily tasks done through the use of technology means that educators must prepare students so they are able to function and compete in a global economy (Brand, 1997; Means, Olson, & Singh, 1995). Some researchers have suggested that "students' use of technology is considered an important indicator of their preparedness to succeed and excel" (Corbett & Willms, 2002), and businesses expect graduates who are technologically literate.

Computers have also become normal fixtures in our schools and homes, and we need to carefully consider their effect on education. A 2002 survey revealed that nine out of ten young people had access to a computer at home, and seven out of ten had internet access in Canada, which was among the highest in the world (Corbett & Willms, 2002). In fact, most of today's students wouldn't remember growing up without computers in their homes and wouldn't remember using record albums rather than Compact Discs (CDs) or Digital Video Discs (DVDs).

Teachers can play a critical role in helping students prepare for the ever-changing nature of technology and help them to use it effectively (Dooley, 1999). Many teachers, however, are not comfortable with using it themselves. McKenzie (1991) stated that "in order to lead students out of the industrial age and into the

information age, teachers must be prepared to adapt and adjust to the many changes that will occur". Technology integration is a very complex process and educators need assistance in meeting this challenge.

Effective professional development (PD) is an important component in helping educators embrace changes, such as using technology in teaching and learning. Too often, the "sit and git" model of professional development has been used, where educators sit and listen to another educator talk about their new program (Gilmore, 1994; Little, 1993). Typically, this expert comes from outside the school jurisdiction to share his or her wisdom. While these types of activity may have a place within a comprehensive professional development plan, they usually do not involve much interactivity or time to practice and solidify understanding of new information (Forcheri, Molfino, & Quarati, 2000; Gilmore, 1994).

A more effective model involves teacher education along with long-term, sustained support where educators are involved in the decision-making regarding their own learning (MacArthur & Pilato, 1995; Parr, 1999; Wetzel & Zambo, 1996). This type of professional development requires a greater commitment and more active participation, but has greater potential for lasting effects (Gilmore, 1994; Parr, 1999). Within it, teachers have continuing support and training in an environment that considers their level of understanding/knowledge and learning style. They are constantly engaged in interactions and have opportunities to share experiences and have time to build relationships with colleagues (Brand, 1997; Cigarillo, 1998; Maor, 1999).

On-going professional development and support has been shown to be particularly effective when mentoring is a part of the process (Holahan, Jurkat & Friedman, 2000; MacArthur & Pilato, 1995; Mather, 2000). Mentoring as a strategy for professional development has been used in many different settings, from business to education. In fact, many institutions use mentoring as a means to enhance recruitment and retention of new employees, upgrade skills or improve employee satisfaction (Kerka, 1998). Mentoring supports much of what is currently known about effective adult learning structures. It takes place within the context of the workplace, includes learning directly linked to job-related duties, and is situational (Kerka, 1998).

When one visualizes a mentor, an older, more experienced person often comes to mind because mentoring is sometimes thought of as a type of transfer of wisdom. In practice, less experienced mentors can be as effective as more seasoned staff if they possess personal qualities that enhance mentoring relationships. New models of mentoring develop relationships where both the mentor and the protégé continually learn from each other (Britnor Guest, 1999).

One study observed that mentoring can "help teachers gain confidence in technology use when presenting technology-enriched content, and the collegiality of the mentoring relationship helped teachers work through a variety of technology problems that may arise in the classroom" (Franklin, Turner, Kariuki, & Duran, 2001).

Such technology mentoring programs can be found within a group of Canadian Schools called the Network of Innovative Schools (NIS). This unique

project, funded through Industry Canada via Canada's SchoolNet, was developed to recognize and encourage schools using Information and Communications Technology (ICT) in meaningful and creative ways to improve learning (Canada's SchoolNet, 2003). Schools that are part of this network have successfully completed a process where each school submits an application to become part of the project and is subsequently judged by a national panel to determine whether or not it qualifies. Any Canadian K-12 school is eligible, provided that is meets the required criteria. NIS schools are described as having a commitment to improving student learning through creative ICT integration (Canada's SchoolNet, 2003).

Problem

The main problem in this research was to determine the characteristics of successful technology mentoring programs. The researcher endeavored to describe the characteristics of selected mentoring programs that have been judged to be successful and that embrace innovative technology integration practices. Within this question were several other areas to explore, such as mentoring relationships and the kind of support needed to ensure an effective program.

Purpose of the Study

The purpose of this research was to add to existing knowledge about professional development as it relates to technology in schools. Mentoring was examined as a strategy for professional development to advance technology integration. The research identified and described those characteristics that are

consistent with successful mentoring programs, including the type of training and support that were required. Through the examination of mentoring programs that were working well and that were seen to be successful, schools may be able to use this information to make decisions about implementing this type of support for technology integration in schools.

Significance of the Study

There has been increased pressure on Canadian educators to implement Information and Communications Technology (ICT) outcomes. In Alberta, for example, the implementation of the provincial ICT curriculum became mandatory in September 2002 (Alberta Education, 1998). Provincial departments of education are moving away from optional ICT implementation as they re-write core curricular areas and embed technology outcomes within them. Many educators are becoming more confident about using technology with their students, but others are either still in the beginning stages or not using it at all. Mentoring programs are an effective way to use existing technology leadership in a school to help all teachers move ahead with appropriate school-based support. Effective integration requires more of a whole-school approach, as opposed to just having one or two teachers be the "computer teachers".

The other strength of having a mentoring program in place is its ongoing nature. Even when teachers begin to feel comfortable, there tends to be a need for further support. The nature of technology itself is ever-changing and teachers need support in order to continue to use technology effectively with their students.

The significance of this study is that it will identify the characteristics of successful programs. Schools that have a need to bring more of their teachers to the level where they can integrate technology effectively could use this information. It could also be used by schools that have a mentoring program in place to determine if there are elements of their current initiative that could be improved.

Limitations

Even though the mentoring programs studied were judged to be successful by a national panel, there are many other schools that may not have applied to become part of the Network of Innovative Schools (NIS) project. There may, in fact, be more successful mentoring projects or other effective models of technology mentoring. The NIS selection committee also attempts to balance schools within geographical areas of Canada, so this may mean that schools that are less innovative than others may be included as they do this geographical balancing. In addition, the number of schools examined was quite small, so it is difficult to generalize the findings of this study.

Using the method of convenience sampling may provide additional limitations. The researcher relied on the judgement of the NIS coordinator to provide names of schools with successful mentoring programs, and this may have excluded some schools that may have been able to provide different insights. In addition, having the mentor identify teachers who had participated in technology mentoring could mean that others with less favourable opinions were not interviewed.

Definition of Terms

ICT: Information and Communication Technology; devices and systems used in processing, transferring and storing information and in communicating through electronic media (Alberta Education, 2003).

K-12: Kindergarten to grade 12; a description of grade levels.

Mentoring: part of "an entire system of training development and improvement" where teachers engage in shared inquiry into their teaching practices (Hargreaves and Fullan, 2000). Teachers develop a one-on-one, ongoing, supportive relationship that takes place at their own school site (MacArthur & Pilato, 1995). This rapport between the mentor and protégé is key to the success of the process.

NIS: Network of Innovative Schools; a government initiative funded through Industry Canada via Canada's SchoolNet, which provides $30,000 over three years to assist schools to network with others, and is comprised of schools who have already been deemed to be successful and innovative in their use of technology (Canada's SchoolNet, 2003).

Professional Development (PD): a process of staff development where teachers are given the opportunity to develop skills, knowledge and abilities to learn on the job

(Morris & Chance, 1997). This can encompass a range of activities from short-term workshops to long-term support (Brand, 1997).

Protégé: sometimes also called a mentee, a protégé is someone who is being mentored and receives support and guidance through this relationship (Young & Wright, 2001).

SchoolNet: Canada's SchoolNet; a federal government initiative that promotes the effective use of ICT in learning (Canada's SchoolNet, 2003).

Technology (Tech): for the purpose of this study, this term will refer to the use of computers and other peripherals, such as printers, scanners digital cameras and other emerging technologies, even though the term "technology" can also encompass much more than just using computers.

Technology integration: "the implementation and diffusion of an innovation throughout the curriculum" (Holahan, et al., 2000). It means that technology is embedded within the context of learning activities (Wetzel & Zambo, 1996).

Technology mentor: someone who provides support to teachers' individual needs in their own technology learning, as well as with technology integration (MacArthur and Pilato, 1995). Technology mentors assist the protégé with integrating technology across the curriculum (Gilmore, 1994).

Organization of the Thesis

Chapter I has provided an introduction to the topic. Chapter II will provide a review of related literature and Chapter III will describe research methods. Chapter IV will review the results and Chapter V will conclude the thesis and will contain, implications of the study and recommendations for future studies.

CHAPTER II: LITERATURE REVIEW

Introduction

There has been a great deal of literature on the topic of technology and education that spans several decades. More recent work has begun to look at effective models of staff development that can help teachers integrate technology as a tool for teaching and learning. This chapter begins with a discussion of effective models of professional development, including the strategy of mentoring. Next, technology and education will be explored, specifically with regard to its importance in society, and how schools can adapt to these kinds of technological changes. Lastly, the literature that deals with necessary supports, including administrative support, technical support and supportive hardware will be explored.

Effective Models of Professional Development

In the past, professional development in general has often been prepackaged, sporadic, and required minimal participation by teachers (Gilmore, 1994; Little 1993). Even though classrooms tend to be complex environments, professional development often engages teachers superficially and typically, is delivered by outside experts. The effect of this type of training has been shown to be limited (Forcheri et al., 2000; Gilmore, 1994; Little, 1993; MacArthur & Pilato, 1995; Persky, 1990).

Recent research indicates that teachers need both inservice education and long-term, sustained support in order to effectively support their learning (MacArthur & Pilato, 1995; Parr, 1999; Wetzel & Zambo, 1996), as the "one time workshop" has

been shown to have limited transfer to teaching practice (Polselli, 2002). Teachers must be involved in the decision-making regarding their own learning. Doing so requires a greater commitment and more active participation, but has greater potential for long-term effects (Gilmore, 1994; Parr, 1999). Ongoing professional development, linked to curriculum and student needs is the preferred model. In it, teachers have continuing support and training in an environment that considers their level and learning style. They are constantly engaged in interactions, have opportunities to share experiences, and have time to build relationships with colleagues (Brand, 1997; Cigarillo, 1998; Maor, 1999; Yost, 2002).

In addition, having PD take place within the school and built into the workday of teachers makes it more effective than that which is external and takes place outside the school day. Such an approach also facilitates collaboration between teachers in the school (Richardson, 2003).

Technology integration is a very complex process and professional development is imperative in ensuring it is effective (Dooley, 1999; Holahan et al., 2000; Kilbane, 1997). Studies have shown that lack of teacher training is one of the biggest roadblocks in making changes of any kind (Brand, 1997; MacArthur & Pilato, 1995). Helping teachers to use technology effectively requires an investment of time, money and support. It is especially imperative in the field of technology because of the constantly changing nature of hardware and software (Brand, 1997; Dooley, 1999; Franklin et al., 2001; Holahan et al., 2000; Parr, 1999). Effective professional development helps teachers become empowered in using technology as a cognitive tool (MacArthur & Pilato, 1995; Major, 1999). This training should have a focus on

instruction, curriculum and students before the technology itself (Brand, 1997; Persky, 1990).

Mentoring

Recent research has focused on mentoring as an example of effective PD. Mentoring can be thought of as "an integrated approach to advising, coaching and nurturing, focused on creating a viable relationship to enhance individual career/personal/professional growth and development" (Young & Wright, 2001). It is a strategy that has been used in many types of organizations, including businesses and schools. It has been seen as an effective training tool and a means to build positive, collegial relationships in a setting that emphasizes learning through authentic experiences (Burke, McKeen & McKenna, 1994). It provides long-term, on-site support, based on individual needs and resources available at the individual schools. (MacArthur & Pilato, 1995; Wood & McQuarrie, 1999). Mentoring in schools has been found to be beneficial because it takes less time away from the classroom than traditional professional development (Gilmore, 1994). It addresses individual learning needs, allows the teacher to immediately apply his/her learning, and is consistent with what we know about adult learners. It also helps teachers to begin to think about daily experiences as opportunities for learning (Brand, 1997; Wood & McQuarrie, 1999).

Technology mentoring can assist teachers in embracing technology and anticipating changes that will accompany its use. It can provide practical experiences to help teachers overcome fears and help them enjoy exploring the capabilities of technology (Brand, 1997; MacArthur & Pilato, 1995). A school-based model helps

teachers to work with colleagues that they already know and with hardware and software that is available to them. This results in increased teacher confidence and actual classroom use (Gilmore, 1994; Parr, 1999).

The relationship between mentors and protégés is a special one. It is a collaborative, rather than a superior/subordinate one, and provides learning opportunities for both people (Holahan et al., 2000; Wetzel & Zambo, 1996; Yost, 2002). The protégé benefits from mentoring "as he or she learns how technology can transform traditional instruction, and the mentor has an opportunity to reflect on his or her own practice of teaching with technology" (Franklin et al., 2001).

Mentors must understand their role and receive training to carry out their work effectively (MacArthur & Pilato, 1995). They must also possess several key qualities. They must have a high level of motivation, be well regarded by peers and have exceptional teaching skills. They should be low-key, supportive people, who have a practical understanding of the kinds of problems teachers might encounter and be able to model effective practices. They must be flexible and foster collaboration and participation. They must be able to provide assistance within the school context and focus on the learning needs of the protégé. A possession of a vision for technology integration and the ability to empower teachers to use technology effectively is also important. Expertise in technology skills is seen as less important than expertise in curriculum and ability to develop positive interpersonal skills (Brand, 1997; Gilmore, 1994; Holahan et al., 2000; MacArthur & Pilato, 1995; Parr, 1999).

Technology in Society and Education

Since the 1980s, microcomputers have increasingly become more prevalent in businesses, schools, and households (Collins, 1991; Dooley, 1999; Wetzel & Zambo, 1996). Technology has changed the way people access, gather, analyze and interpret information and is an essential tool for doing work. Within the last decade especially, the amount of information technology available in schools and at home has increased dramatically (Collins, 1991; Gilmore, 1994). Most students in schools today have grown up around computers and thus, have a sense of authenticity in using technology. Schools will face challenges as they prepare students to compete in an emerging, competitive, information-based, global economy (Collins, 1991; Dooley, 1999). Using technology in new ways also means that some changes inevitably occur in our schools, such as accepting that some students will have more technical expertise than the teachers.

Change and Education

Generally, school culture, organization and teaching practices have not changed a great deal over the last many decades (Dooley, 1999; Norton, McRobbie & Cooper, 2000). Schooling tends to be conservative by nature. Some researchers believe that the main reason that technology hasn't reformed education is because of the "tendency of individuals and institutions to resist change" (Szabo, 1999). Existing pedagogical beliefs and a lack of a collaborative environment in schools are barriers to implementing change (Parr, 1999; Wiburg, 1997).

Research has shown that a systemic, holistic, collaborative approach is necessary because change is a process, not an event (Dooley, 1999; Holahan et al.,

2000). It involves a cooperative effort by all stakeholders, and teachers are key stakeholders. Their beliefs and attitudes are important factors in determining if making changes to integrate technology as a regular practice becomes a reality (Norton et al., 2000; Parr, 1999). To make changes, schools need to be open, non-threatening environments that foster a high degree of professionalism (Brand, 1997; Dooley; 1999).

Role of the Teacher

Rapid changes in technology and society mean that teachers are called upon to change their role, as well as having to use new tools and methods. (Forcheri et al., 2000). Teachers often teach in the same way in which they were taught, however, and they must be convinced that making changes will make tasks more effective and efficient than their current methods (Dooley, 1999; Norton et al., 2000). Traditional methods are more didactic and this approach is also the one favored by many members of the general public. Teachers are seen to be experts whose role it is to transmit their knowledge to students (Collins, 1991). Using technology effectively requires a different approach, however.

Technology is a tool that can facilitate long-term projects involving meaningful, challenging content. The role of the teachers, and their tools and methods in facilitating such projects, must also shift. This environment requires that classrooms must be organized, while students pursue different questions at different speeds, using many technologies (Collins, 1991; Forcheri et al., 2000; Means et al., 1995). This type of learning has been referred to as constructivism, where teachers act as facilitators in helping students construct their own meaning about the world by

helping them to engage in meaningful learning experiences (Collins, 1991). Research has shown that teachers who use technology with their students are more likely to use constructivist methods than non computer-using teachers (Becker, 2000). In fact, students can push beyond teachers' own skill and knowledge and may be considered resident experts and share their knowledge with others (Cigarillo, 1998; Means et al., 1995). Teachers need to be learners themselves in order to create a constructivist learning environment (Dooley, 1999; Maor, 1999). Seymour Papert concurred with these ideas and stated that "technology is obsoleting the model of a learning environment in which teachers-who-know hand out knowledge to students-who-know-not" (Papert, 1998).

Technology Integration

Having hardware and software available in schools is not enough to ensure their effective use. Teachers must also understand how technology can be used as a tool to enhance teaching and learning, so it is important to study successful models of technology integration (Gilmore, 1994). The goal of technology integration is to have it embedded within the curriculum in the context of learning activities (Wetzel & Zambo, 1996). Technology integration happens when teachers are able to use technology in a sustained way to support their students (Persky, 1990). Becker (2000) states that:

> …under the right conditions – where teachers are personally comfortable and at least moderately skilled in using computers themselves, where the school's daily schedule permits allocating time for students to use computers as part of class assignments, where equipment is available and convenient to permit

> computer activities to flow seamlessly alongside learning tasks, and where teachers' personal philosophies support a student-centered constructivist pedagogy that incorporates collaborative projects defined partly by student interest – computers are clearly becoming a valuable and well-functioning instructional tool. (p. 2)

Effective activities can include storing and manipulating information, providing tools for writing, accessing information, communication, and representing concepts and objects (Collins, 1991; Means et al., 1995). Tools have been created to begin to assess the kind of integration that is taking place, such as the Levels of Technology Implementation (LoTi) Framework. This tool has teachers answer a questionnaire which then rates their technology integration use from level zero (non-use) through seven levels: awareness, exploration, infusion, integration (mechanical), integration (routine), expansion, and refinement (Moersch, 1999).

Necessary Supports

Supporting a school staff in integrating technology requires support in several areas, including having a supportive school administration, time to learn and adequate equipment and technical support.

Administrative Support

Substantial administrative support is needed to implement innovations such as technology integration. This is because administrators often serve as change agents between the adopters and those who want to see changes (Dooley, 1999). School principals are often the primary people who either support or discourage individuals

in risk-taking (Dooley, 1999; Holahan et al., 2000). They must provide sustained, positive leadership and follow through with commitments of finances, resources, and supportive action (Brand, 1997; Holahan et al., 2000; Norton et al., 2000). It is important that they have a vision for education in an information-based society and be supportive of programs that support teacher training, including regular meetings, technology planning, team-teaching, and coaching (Brand, 1997). They must also be able to "assure teachers that the goal of technology is to improve teaching and learning, not to replace teachers" (Slowinski, 2000). Successful technology integration requires a high degree of administrative support (Holahan et al., 2000; MacArthur & Pilato, 1995; Wiburg, 1997).

Providing adequate funding is another way that administrators can support the use of technology. Districts typically spend six percent to fifteen percent of their technology budgets on professional development activities, often on learning applications as opposed to learning how to create effective learning experiences using technology (Franklin et al., 2001). Funding is required for release time for teachers and mentors to collaborate as well as for meaningful, school-based technology professional development.

Time

In order for teachers to be comfortable in using technology throughout the curriculum, there must be a "significant investment of time" (Slowinski, 2000). This includes time for professional development and mentoring opportunities. Ideally these activities are integrated into the workday of teachers, as opposed to after school

when teachers are not in a state for optimal learning (McKenzie, 1991; Yost, 2002). According to Brand (1997):

> Teachers must have substantial time if they are going to acquire and, in turn, transfer to the classroom the knowledge and skills necessary to effectively and completely infuse technology into their curricular areas. (p. 10)

They must have enough time to experiment with the technology, share with colleagues and plan effective lessons (Franklin et al., 2001).

Equipment and Technical Support

Effective integration cannot happen without adequate equipment and technical support. A supportive infrastructure is crucial (Holahan et al., 2000). Even though there has been a significant increase in the amount of technology available, schools continue to struggle with finding enough time to use it effectively (Wetzel & Zambo, 1996). We cannot expect that technology will become a useful support for students if they only have access to it for a few minutes each week. Studies have shown that there is less integration success in schools that have little or poorly maintained equipment (Holahan et al., 2000; Means et al., 1995). Many schools still "lack the infrastructure to support the most promising applications of technology" (Franklin et al., 2001). Conversely, teachers with a reasonable number of computers available are more likely to provide opportunities for their students to use technology in their studies (Becker, 2000).

Summary

The literature reveals that many conditions are necessary for the successful integration of technology in the classroom. Teachers need ongoing, sustained professional development activities available, preferably on-site. They also need to recognize that technology is changing the way we do work in our homes, businesses and our schools. Using technology in a meaningful way means that schools and the roles of teachers must change to a degree as well. Teachers need the support of administrators and a supportive technology infrastructure in order to make such transformations. With rapid advances in technology and the increasing numbers of computers in our schools, workplaces and homes, we must explore ways to assist teachers so they can, in turn, help students be prepared for our changing society.

CHAPTER III: RESEARCH METHODOLOGY

Introduction

This chapter describes the research methods, participants, ethical considerations data collection and data analysis used for this study. In the first part of this study, survey and interview instruments were developed and pilot-tested. The second part of the research involved surveying technology mentors and their administrators to determine the kinds of activities they participated in as well as the time and money they invested in these efforts. The third part of the study involved interviewing technology mentors, their protégés and their administrators to gain a deeper understanding of their experiences in a successful technology mentoring program.

Research Methods

Survey and interview research methods were chosen for this study. These methods were used in order to gain an understanding of the characteristics that make technology mentoring programs successful. The surveys were conducted online, and contained questions that had to do with the details of the program, such as the costs of the program and frequency with which certain types of mentoring occurred. Interviews were used to get more detailed information about the programs and the participants' perceptions of the success of technology mentoring at their sites.

The purpose of this research was to examine the characteristics of successful mentoring programs using the experiences of mentors, protégés, and administrators.

Even though certain information was specifically measurable, much of the data obtained was interpretive and based on the perceptions of the participants. The participants in this study were mentors, protégés, and administrators from NIS schools who volunteered to be part of the study. The researcher solicited participation through written and telephone contact, so the method used was convenience sampling.

Participants

The subjects were educators who participated in mentoring programs deemed to be successful by their induction into Industry Canada/SchoolNet's Network of Innovative Schools. The researcher attempted to obtain participation from all ten schools that fell into this category. Four schools agreed to participate in the study. The first was a small elementary school with an established mentoring program. The second and third were similar-sized schools with students from kindergarten to grade seven in the far north. The last was a large high school in a small town (grades nine to twelve) that utilized multiple mentors in the school.

Network of Innovative Schools

Participating school sites were all members of the Network of Innovative schools.

According to information on the SchoolNet website, schools that have been inducted into the NIS have the following nine characteristics:

(1) student-centered philosophy

(2) long and short term technology planning

(3) a culture of innovation

(4) readily available technology

(5) ongoing professional development

(6) an established framework of support for using ICT

(7) administrative support

(8) a culture of collaboration within the community and beyond

(9) collaboration within the school

The applications are first screened by NIS staff to see that they are complete. Next, they are scored and evaluated by a national selection committee made up of education stakeholders. Finally, they are ranked and participants are selected, with an attempt to distribute involvement among the provinces and territories.

The scoring rubric has five sections: (1) contact information, (2) ICT vision statement and current action plans, (3) school profile, (4) collaboration, networking and mentoring, and (5) community involvement in ICT use in the school. Sections two, four, and five are scored using a four-point rubric as follows (sections one and three are given a value of zero, since they contain information items only):

(1) Level four – superior responses

(2) Level three – good responses

(3) Level two – responses requiring improvement

(4) Level one – poor or incomplete responses

Each school receives a grant from Industry Canada of up to $10,000 per year for three years to continue their work, as well as to enable them to network with other schools considered to be leaders in ICT in Canada.

Ethical Considerations

Participation in this study was voluntary and subjects were assured of their anonymity in that they would not be identifiable in any of the materials produced as a result of this research. Participants interviewed in person were asked to read and complete a consent form (Appendix A). When subjects were interviewed by telephone, the researcher first read through the participant rights and obtained verbal consent. This verbal consent was followed up with a consent form, sent in a self-addressed, stamped envelope, which the subjects returned to the researcher. In-person and telephone interviews were tape recorded so that their interview could later be transcribed for analysis. In the online surveys, a statement at the end indicated that participants agreed to have their data used in this study by clicking the submit button.

Confidentiality and anonymity was essential as the data was collected. Names were initially matched with participant codes and the matching list of codes and names was destroyed after the data compilation phase was complete.

A technology support person helped with the posting of the online survey, and this person signed a form as a research assistant/transcriber and agreed to keep all information to which he had access confidential. Once all of the data was collected, it was removed from its secure online storage, downloaded into a database for analysis, and given to the principal researcher. Subsequently, it was removed from the technology support person's computer and only stored on the researcher's password-protected computer. At no time did the technology support person have access to the list that matched the participants' names to the participant codes.

Procedures for Eliciting Participation

The researcher worked with an NIS coordinator to identify schools that were considered to have outstanding technology mentoring programs. Mentors at these schools were contacted by email and telephone initially, to determine whether or not they would be interested in participating in the study.

Next, a letter was mailed to district superintendents (Appendix B) of those schools indicating a willingness to participate, to acquaint them with the nature of the research and to elicit their support. Once this consent was obtained, principals were mailed a letter requesting their participation (Appendix C). Mentors were mailed a letter once their administration indicated their school would join in the study (Appendix D).

Finally, technology mentors at each school were asked for the names of teachers they had mentored during the course of their project. These teachers were contacted to ask if they would be willing to participate in this research (Appendix E).

Instrumentation and Data Collection

Data for this study was collected using the five instruments described below. They were developed to provide data specifically for this study and were first piloted with a group of three educators at a school site that had a technology mentoring program in place.

The Technology Mentor Survey

This online instrument (Appendix F) was designed to collect information regarding: (1) mentoring time (number of years/months they had been doing formal and informal mentoring, the amount of assigned time for mentoring, how teachers request support and when mentoring activities take place), (2) their mentoring duties/role (what types of mentoring activities they facilitate), (3) time spent on mentoring activities (working one-on-one, working with teachers and students, working with staff only, technology planning, etc.), (4) frequency in mentoring *individual teachers* (hardware, software, communication, information access and retrieval) and (5) frequency in mentoring *groups of teachers* (hardware, software, communication, information access and retrieval).

The Administrator Survey

The purpose of this survey (Appendix G) was to gather demographic information about the school including grades taught, number of teaching staff, number of computers and their location. It also gathered information about the school's mentoring program and how involved the administrator was in the professional development. The last section asked questions regarding expenditures on computer hardware, software, mentoring, and other technology professional development.

This survey was also administered online, and the same procedures were used to ensure that the data was secure and the results remained confidential as were used with the technology mentor survey.

The Technology Mentor Interview

This interview instrument (Appendix H) used a series of questions to gather more specific information about the mentors' experiences within a technology mentoring program. Some interviews were conducted face-to-face and others were conducted over the telephone. The mentor interview questions were designed to gather information on the following topics: (1) description of background and education in using technology. This question was used as an "ice-breaker" as well as to determine whether mentors were generally self-taught or had university training in using technology, (2) planning (technology professional development planning, reasons for choosing a mentoring program, and the goals of their mentoring program), (3) defining mentoring and its role (what mentoring means, qualities of a good mentor, types of staff mentored, mentoring activities and mentoring as a model of professional development), (4) success of the program (indicators of success, examples of how mentoring helped students use technology more effectively, and feedback given regarding their mentoring program) and (5) support (where mentors receive support and the form it takes).

The Administrator Interview

The Administrator Interview (Appendix I) was designed to give administrators an opportunity to elaborate on their school technology mentoring programs, and the researcher an opportunity to ask open-ended questions to reveal more about their role in supporting such programs. As with the mentor interviews, some were conducted in person and others over the telephone. The questions were divided into the following topics: (1) background in using technology (again, an "ice-breaker" question), (2)

mentoring (how technology mentors were selected, qualities of effective mentors, indicators of success, and mentoring as a model of professional development) and (3) the support they provide for their technology mentoring program.

The Protégé Interview

This instrument was used (Appendix J) to probe participating protégés regarding their role in technology mentoring and if they felt that it helped them integrate technology with students in more effective ways. It contained questions relating to mentoring: (1) how technology mentoring helps them integrate technology through the curriculum, (2) activities for which they receive mentoring, (3) description of an example of how mentoring has assisted them, (4) qualities of an effective mentor and (5) mentoring as a model of professional development.

Interviews were conducted in-person where possible and otherwise, over the telephone. Each interview concluded with an open invitation for participants to add any other comments or ideas about technology mentoring.

Development of Instruments

The researcher used the literature review as well as personal experience to develop the content for the surveys and instruments. The interview questions were open-ended, but the researcher developed a series of possible responses to use as prompts in order to probe for more information, if necessary.

Many modifications and revisions were made to the instruments prior to pilot testing. For example, there initially was a protégé *survey* to be administered, but since there was limited quantitative data the protégés could provide, it was decided

that conducting *interviews* with this group would provide the most relevant information about their experiences in a technology mentoring program.

Pilot Testing of Instruments

Before the data collection phase, the instruments were pilot-tested on a small group of educators in the spring of 2003. These educators were from another NIS school with a technology mentoring program that had begun, but was not as well established as those in the schools that were chosen to participate in the study. The pilot test was conducted with the mentor, the principal and a protégé.

The technology mentor at the school completed the mentor survey online to check to see if the form was working properly as well as to provide feedback about the clarity of the questions. The mentor then participated in a telephone interview to check the structure and format of the mentor interview instrument.

Using a similar process, the administrator survey and interview instruments were pilot tested by the school principal. A teacher at the school completed the protégé interview over the telephone. All participants were informed prior to participating that they would be answering the survey and interview questions, and then would be asked for feedback regarding the instruments. The pilot test participants shared their perspectives with enthusiasm and offered several suggestions for improvement. These suggestions were incorporated into the final versions of the instruments and procedures.

The pilot test also verified that the times required to complete the surveys and interviews were reasonable. The mentor survey was the longest and the pilot tester

indicated that it took her approximately thirty minutes to complete. The mentor interview pilot took approximately fifty minutes, while the administrator and protégé interviews were shorter (approximately thirty minutes each). The administrator indicated that he had some difficulty in finding some of the financial figures requested for the Administrator Survey, but after discussing this issue, it was decided that going back to financial records to find exact figures was not necessary and that, instead, a reasonable estimate of expenditures on ICT would suffice.

The researcher took notes during the interviews, and the interviews, both in-person and telephone were tape recorded and transcribed. The pilot test indicated that the interviews provided details that were not attainable through the surveys alone.

Data Analysis

The interviews were transcribed and information was organized into themes. A matrix was created to provide an overview of the information gathered. Next, the data from the surveys was analyzed and added to the themes that had emerged in the interviews.

Summary

This chapter gave an overview of research methods and the participants. It also gave details about the surveys and interviews, the process used in their development, and the data analysis process.

CHAPTER IV: RESULTS

Introduction

The purpose of this chapter is to discuss the results from the interviews and surveys conducted. The interviews were designed to seek out the perceptions of technology mentoring programs from the point of view of mentors, protégés, and administrators. The surveys provided additional, more quantitative information. Initially, the researcher anticipated that there would be differences between the responses of the three groups in relation to a specific topic – in fact, the responses were very similar. Instead of finding differing perspectives on a particular topic, themes emerged, with participants echoing very closely related thoughts. In this section, the descriptors of the data collection phase will be discussed, followed by the reporting of findings according to the five themes that emerged. These themes were: technology mentoring programs, importance of the mentor, mentoring as a model for professional development, support for technology mentoring programs, and the factors contributing to the success of mentoring programs.

Descriptors

Descriptive information regarding the data collected, the sites studied, and information collected from the interviews and surveys is provided in this section.

School Sites

Four school sites agreed to be part of this study. All four had mentoring programs that had been in place for at least three years. Even though their

demographics (as shown in Table 1) were different, the manner in which they described their technology mentoring programs was very similar.

Table 1. Demographics of Participating School Sites

School	Grade levels in the school (K=Kindergarten)	Number of teachers	Number of full time equivalent (FTE) teachers	Location description	Location population (Statistics Canada, 2001)
Site 1	K-6	16	13.3	city	53 081
Site 2	K-7	29	24.4	city, far north	19 058
Site 3	K-7	29	26	city, far north	19 058
Site 4	9-12	38	24.8	town	10 792

In order to facilitate discussion of the findings, Table 2 shows the location of the mentors, protégés, and administrators by school site.

Table 2. Location of Mentors, Protégés, and Administrators by School Site

School	Mentors	Protégés	Administrators
Site 1	Mentor 1	Protégé 1 Protégé 2	Administrator 1
Site 2	Mentor 2	Protégé 3 Protégé 4	Administrator 2
Site 3	Mentor 3 Mentor 4	Protégé 5 Protégé 6 Protégé 7	Administrator 3 Administrator 4
Site 4	Mentor 5 Mentor 6	Protégé 8 Protégé 9	Administrator 5

Interviews

Interviews were conducted in person with participants at Site 1, and over the telephone with the three remaining schools that were located a long distance from

where the researcher was situated. A total of six mentors were interviewed from participating schools. At Sites 1 and 2, there was one mentor responsible for the technology mentoring program. At Sites 3 and 4, there were multiple mentors involved and two mentors from each of these sites were interviewed. These interviews took approximately forty minutes, and included questions to find out more information in the areas of planning, their role as a mentor, the perceived success of their program, and support for mentoring (see Appendix H).

The next set of interviews were with the protégés. Two protégés were interviewed from Sites 1, 2 and 4, and three protégés from Site 3. Each interview lasted approximately twenty-five minutes. The Protégé Interview (Appendix J) asked questions about how mentors supported them as technology learners and how having a mentoring program helped them to integrate technology in their teaching.

The principal was interviewed at each site as the administrator responsible for supporting the technology mentoring program using the Administrator Interview (Appendix I). In addition, an assistant principal from Site 3 was interviewed, as she was keen to share her insights into their program. Thus, a total of five administrators were interviewed from the four sites. Administrator interviews took approximately thirty minutes each and included questions designed to elicit more detailed information about the schools' technology mentoring programs, and how the schools' administration supported them.

Surveys

A total of six mentors from the four sites participated in the mentor surveys (Appendix F). These surveys (which were conducted online) collected demographic

information as well as the time made available for mentoring and the types of mentoring activities that were pursued. The five administrators interviewed also completed an administrator survey (Appendix G) that contained demographic information about the school and about technology mentoring activities. The data from the survey helped to give more detail to comments made during the interview process.

Theme 1: Technology Mentoring Programs

Mentors and administrators gave information about their experiences that included why they decided to choose mentoring as a way to increase technology integration among teachers, what mentoring meant to them, and how they planned for mentoring.

Deciding to Advance Technology Through Mentoring

Schools had a variety of needs to which they were responding that led them to implement a technology mentoring program, including mandatory ICT outcomes, and past models that didn't work. For two sites, the province in which they were located had implemented mandatory ICT outcomes and they did not have many teachers who were able to achieve them. Mentor 6 said:

> …we just found that actually we had a greater need for teaching technology than we had a supply. We had some people who were keen to do it and were interested in technology but were a little afraid to go there alone. And so we had some people, myself being one of them, who were willing to work closely with them to get them up to speed.

Administrator 3 said that his staff felt technology had to be a priority and he hired someone who could champion necessary changes. Site 2 had a similar need and Administrator 2 felt that hiring a mentor "would revolutionize how we do technology in our school." Mentor 1 explained that their technology planning team had looked at research and felt that mentoring was the best way to bring about more effective technology use. Mentor 2 had helped to advocate for a mentoring program because of what had been tried at the school in the past. She commented, "We knew pull-out technology teaching didn't work", so their staff went on to implement a technology mentoring model that helped to diffuse technology in a greater way throughout their school.

Defining Mentoring

Since there are many definitions of mentoring, mentors were asked to describe what mentoring meant to them. All of the mentors described it as a collaborative kind of relationship, as opposed to having an expert simply impart their knowledge to their protégés. Mentors 1 and 2 described mentoring as a collaborative process of learning. Mentor 2 went on to say that mentoring cannot be a "power" relationship if it is to be successful. Mentor 6 described mentoring by saying, "I think it is a two way street. I think people are getting exposure to skills. Just as important, people are getting a chance to share theirs with someone else and see value in that." The mentors acknowledged that they needed to be confident in using technology but didn't necessarily need to be a "guru". Mentor 5 described the process of mentoring as helping a colleague feel "…solid enough ground that they can go off on their own".

Planning for Mentoring

Schools articulated their goals for their program in a variety of ways. All four sites had some sort of a technology committee that helped to set directions for their school and to plan for things like mentoring, professional development, and purchases of hardware and software. Mentor 1 said that their goal for technology mentoring was simple. It was that "all children… would have technology integrated into their curriculum and use it in a meaningful way". Mentor 4 said that their goal was "to support teachers in whatever project they want to do in technology". The mentors at Site 4 indicated that they considered technology goals that had been set at a district level and then wove those ideas into their school's goals.

Working with Small Groups

All of the schools studied provided support for small groups of staff members. This took place in a variety of times, from time set aside during staff meetings, at lunch, after schools and during professional development days. The process of working with groups of staff members started with the mentor(s) either choosing an area of perceived need or working with a technology planning or professional development committee to focus on a stated area of desired growth.

Several mentors felt that this group work, where they worked with teachers on specific skills, helped to provide a foundation of comfort and an understanding of what could be done with technology. Some teachers could take what they learned in these sessions and begin to work on their own with students, others required ongoing mentoring support in order to begin implementing technology in their classes.

Tables 3 to 6 describe the frequency with which mentors worked with small groups of teachers on a variety of activities.

Table 3. Number of Mentors Who Work with Groups of Teachers on Hardware (n=6)

Hardware	Number of mentors who hold group mentoring sessions			
	Never	Rarely (1-2 group mentoring sessions per year)	Sometimes (3-4 group mentoring sessions per year)	Frequently (5 or more group mentoring sessions per year)
Printers	0	3	3	0
Scanners	0	3	2	1
Digital cameras	1	3	0	2
Digital video cameras	1	4	0	1

Table 4. Number of Mentors Who Work with Groups of Teachers on Software (n=6)

Software tool	Number of mentors who hold group mentoring sessions			
	Never	Rarely (1-2 group mentoring sessions per year)	Sometimes (3-4 group mentoring sessions per year)	Frequently (5 or more group mentoring sessions per year)
Operating system (e.g., basic use of Windows)	1	1	4	0
Word processors	1	2	3	0
Databases	2	4	0	0
Spreadsheets	2	3	1	0
Presentation software (e.g., Hyperstudio, PowerPoint, KidPix)	0	2	2	2
Draw/paint/photo (e.g., Photoshop)	1	2	3	0

Table 4 continues.

Table 4 (continued)

Software tool	Number of mentors who hold group mentoring sessions			
	Never	Rarely (1-2 group mentoring sessions per year)	Sometimes (3-4 group mentoring sessions per year)	Frequently (5 or more group mentoring sessions per year)
Video editing (e.g., iMovie)	2	2	0	2
Web page creation (e.g., Dreamweaver, FrontPage)	0	3	1	2
Instructional support (e.g., marks or attendance programs	1	2	2	1
File transfer (e.g., Fetch)	2	1	2	1

Table 5. Number of Mentors Who Work with Groups of Teachers on Communication Activities (n=6)

Communication	Number of mentors who hold group mentoring sessions			
	Never	Rarely (1-2 group mentoring sessions per year)	Sometimes (3-4 group mentoring sessions per year)	Frequently (5 or more group mentoring sessions per year)
Email	1	3	1	1
Online collaborative projects	5	0	0	1
Videoconferencing	5	1	0	0

Table 6. Number of Mentors Who Work with Groups of Teachers on Information Access and Retrieval (n=6)

Information access and retrieval	Number of mentors who hold group mentoring sessions			
	Never	Rarely (1-2 group mentoring sessions per year)	Sometimes (3-4 group mentoring sessions per year)	Frequently (5 or more group mentoring sessions per year)
File management (local or network)	1	3	0	2
Internet research	1	2	3	0
CD-ROM research	2	3	1	0

During the interviews, mentors commented that the types of mentoring sometimes revolved around hardware and software issues. For example, if a school purchased a digital camera for the first time, the mentor might hold a formal or informal session to show how to use the new hardware. In this way, the frequency with which mentors worked on different activities was directly related to the needs of the staff and these needs evolved over a period of time.

Working with Individuals

Technology mentors at the schools worked with individual teachers in a variety of ways. At times, it would be as simple as informal exchange of ideas in the staff room. On other occasions, it would be a scheduled time where a mentor would work with the protégé's class so that the protégé could watch how the technology lesson worked with their students. Mentor 3 indicated that their system of finding protégés was through "simple sign up and informal chats". In addition he was

available to help with any urgent concerns if there were specific projects that they had in mind. This was similar to how the other mentors found colleagues who wanted help. None of the mentors indicated that they were directed to work with staff members (i.e., their mentoring programs were voluntary). Tables 7 through 10 describe the types of mentoring activities undertaken by mentors with individual teachers.

Table 7. Number of Mentors Who Work With Individual Teachers on Hardware (n=6)

Hardware	Number of mentors who work with individual teachers			
	Never	Rarely (1-2 one-on-one mentoring sessions per year)	Sometimes (3-4 one-on-one mentoring sessions per year)	Frequently (5 or more one-on-one mentoring sessions per year)
Printers	0	2	2	2
Scanners	0	3	1	2
Digital cameras	0	1	2	3
Digital video cameras	2	1	2	1

Table 8. Number of Mentors Who Work With Individual Teachers on Software (n=6)

Software Tool	Number of mentors who work with individual teachers			
	Never	Rarely (1-2 one-on-one mentoring sessions per year)	Sometimes (3-4 one-on-one mentoring sessions per year)	Frequently (5 or more one-on-one mentoring sessions per year)
Operating system (e.g., basic use of Windows)	1	1	4	0
Word processors	1	2	1	2
Databases	2	4	0	0

Table 8 continues.

Table 8 (continued)

Software Tool	Number of mentors who work with individual teachers			
	Never	Rarely (1-2 one-on-one mentoring sessions per year)	Sometimes (3-4 one-on-one mentoring sessions per year)	Frequently (5 or more one-on-one mentoring sessions per year)
Spreadsheets	1	4	1	0
Presentation software (e.g., Hyperstudio, PowerPoint, KidPix)	0	1	3	2
Draw/paint/photo (e.g., Photoshop)	1	1	4	0
Video editing (e.g., iMovie)	1	2	1	2
Web page creation (e.g., Dreamweaver, FrontPage)	1	0	2	3
Instructional support (e.g., marks or attendance programs	0	3	2	1
File transfer (e.g., Fetch)	2	1	1	2

Table 9. Number of Mentors Who Work With Individual Teachers On Communication Activities (n=6)

Communication	Number of mentors who work with individual teachers			
	Never	Rarely (1-2 one-on-one mentoring sessions per year)	Sometimes (3-4 one-on-one mentoring sessions per year)	Frequently (5 or more one-on-one mentoring sessions per year)
Email	0	1	3	2
Online collaborative projects	0	1	3	2
Videoconferencing	5	1	0	0

Table 10. Number of Mentors Who Work With Individual Teachers on Information Access and Retrieval (n=6)

Information access and retrieval	Number of mentors who work with individual teachers			
	Never	Rarely (1-2 one-on-one mentoring sessions per year)	Sometimes (3-4 one-on-one mentoring sessions per year)	Frequently (5 or more one-on-one mentoring sessions per year)
File management (local or network)	2	0	2	2
Internet research	1	0	2	3
CD-ROM research	1	3	2	0

Through the interviews, it was learned that the decisions about the types of activities mentors undertook with protégés were arrived at in an informal, collaborative manner. Typically, mentors and protégés would chat about curricular topics and pedagogy, and then discuss how technology might be used to both enhance the area and address ICT outcomes.

Informal Mentoring

Informal mentoring also took place in all of the schools studied. Some schools created time, either during lunch or after school, when teachers could drop in and receive informal help on anything they were working on. One school created an innovative support that they called the "Tech Café". The Tech Café consisted of an open lab that teachers could use to "play" with technology. The café was open after school hours on designated school days and a mentor was always present. Coffee and snacks added to the ambience of the café. Mentor 6 commented on the value of having "experts right around the corner, in the same building."

Theme 2: Importance of the Mentor

Each of the groups interviewed was asked about the qualities of an effective technology mentor, and participants felt that certain traits were very important to the success of their programs. Among the traits mentioned most frequently were the need to have a certain level of knowledge about technology, strength in communication and interpersonal skills, empathy/patience, risk taking, and passion for technology.

Knowledge of Technology

Administrators and protégés pointed out that the mentor must have a level of comfort and proficiency in using technology. They felt that the ability to do technology troubleshooting was also important. However, several mentors, protégés, and administrators mentioned that mentors need not be "gurus", but they should understand how to weave technology effectively throughout the curriculum. Administrator 2 said that mentors must "understand that it's not computers that you're teaching, but you're teaching kids to learn and you're using computers as a tool and it's to interact with to work through projects". Protégé 1 felt that having someone who was not a total expert was a benefit. She said, "I think we can take heart from somebody who doesn't know it all, but can figure it out or find out. It gives the rest of us hope we can get there someday too." Interestingly, none of the mentors mentioned that technology proficiency was one of the important qualities of a mentor. All six mentors commented that they were primarily self-taught users and felt that this "self-teaching" was done out of an initial personal interest, rather than formal training or self-professed expertise.

Communication Skills

All three groups felt that the ability to communicate was very important. Administrators 3 and 4 thought that being able to make technology understandable to both adults and students was a critical quality. Protégé 1 said that it was important for learners to have "somebody on site that knows the curriculum and is able to explain things". Mentor 5 stated that mentors must be "comfortable enough with their communication skills to actually be able to explain things to people".

Interpersonal Skills

Interpersonal qualities were mentioned as being very important for the success of the programs. Several of the administrators commented that it was important that mentors were personable. The majority of mentors and protégés said that strong interpersonal skills or "good people skills" were definitely necessary in building a mentoring relationship. Kindness, caring, and having a sense of humour were examples of other interpersonal skills thought to be important. Mentor 1 commented that mentors needed to be able to "laugh at themselves".

Empathy/Patience

Since many protégés did not have a great deal of experience in using technology, it was important for mentors to have empathy and patience with novice technology users. Administrator 4 thought that mentors must understand that "many people have a technology block and be sensitive to that". Several mentors felt that it was important to be able to put themselves in the shoes of a new technology learner. Mentor 2 stated it was important to function as someone who "hasn't forgotten how it

feels to learn something new with technology". All protégés believed that patience was a key.

Protégé 1 commented that it was important that protégés feel that "no question is too stupid" and that the mentor "doesn't mind repeating, and going over and over again". Mentor 6 acknowledged that "if you don't have the patience for it, people are going to get turned off".

Flexibility

Flexibility was also seen to be an important quality, as mentors were called upon to do a variety of other technology duties in addition to a wide range of mentoring activities. Table 11 describes some of these duties.

Table 11. Number of Mentors Performing Other Duties

Other duties performed by mentors	**Number of mentors performing this duty**
Planning for mentoring	6
Ordering hardware/software	4
Developing technology plans	6
Providing technology support	6
Other	0

Risk Taking

Participants in all three groups mentioned risk-taking as a valuable trait. Administrator 5 stated that risk taking is important "because I think they have to be open to ideas and approaches because they are working with a lot of different

personalities within one building and not everybody thinks and does things in the same way."

Protégé 4 thought that it was "important that mentors be capable of trying unknown things." Mentor 1 commented that a good mentor is "someone who is willing to step out of their zone and try things that maybe they are not comfortable with."

Protégés also felt it was important for the mentors to encourage them to also venture out of their comfort zone. Protégé 7 described her experience with the mentor by saying, "He allowed you to experiment and discover yourself, and then it [technology learning] became that much more meaningful". Administrator 1 also said it was important for mentors to always be quick to compliment protégés for every small step they took.

Passion for Technology

Having passion for using technology in teaching was thought to be an essential characteristic of a mentor. Administrator 5 explained that effective mentors are:

> …passionate about technology and they are passionate about teaching and learning. I mean, they are excited about technology and what it does to their teaching, and what it does to learning and they want everybody to know about it.

Protégé 9 felt that it was important that mentors "care about technology so everybody is more competent" and be able to provide inspiration for others. Most of the mentors also expressed that having enthusiasm and motivation were important in having staff members join in the process of learning about technology.

Theme 3: Mentoring as a Model for Professional Development

All three groups spoke strongly about mentoring being an effective model of professional development, as opposed to other types of PD such as workshops or conventions. Some of the benefits they described were development of relationships, opportunities for cooperative planning, just-in-time support, active, continuous learning, and needs-driven learning.

Relationships

Even though questions were not asked specifically about the relationships developed between mentors and protégés, the importance of having and developing relationships with mentors was mentioned frequently. For example, Protégé 5 talked about the existing relationship between herself and the technology mentor, and how that helped increase her comfort level at the beginning of the project. She indicated that, "knowing [the mentor] was the big thing that happened that gave me the opportunity to start integrating it [technology]". Mentor 1 described the mentoring relationship as a kind of friendship. She went on to say that mentoring "has to be that feeling of intimacy almost between people. They [protégés] have to feel comfortable with the person." She also described an effective technology mentor as having "all the qualities that would apply to a good friend". Administrator 3 also believed that "in order to have a mentoring situation in a school you have to have a personal relationships first".

Cooperative Planning

The mentoring relationship facilitated cooperative planning between mentors and protégés. Protégé 5 described this type of planning:

> We brainstormed ideas and we came up with ideas. I had lots of ideas but no way of implementing them because I did not have the skill level [in technology]. He [the mentor] supported that implementation of ideas that we brainstormed together.

Protégé 8 discussed a similar process. She explained, "I'll come up with the ideas and then I'll have a tech expert help me take what I have of an idea and make it work". Mentor 2 discussed the importance of this type of collaboration and how it worked more effectively for their school than having one teacher do the technology teaching for the whole school. She said:

> I used to do the computer teacher thing, but this model is doomed to fail because there is never any carry-over. I was trying to tie as much as possible into their [other teachers'] curriculum covering ICT and regular curriculum. It required the teacher to be involved somewhat, but we needed a system for collaboration.... [We felt a] mentoring program would actually make some changes and create a new environment in our school. There wasn't going to be any change if just one person kept taking kids to the computer room. We actually needed to involve everyone in the process to see change.

Administrator 2 described the cooperative planning process in a mentoring relationship:

> It's a back and forth thing, it's a give and take, and I think the key reason that it works is that one, those people who are working together are professionals. Both learn from each other and the line of communication is consistent

> throughout the project. That's the biggest key between that and any other form of inservicing one can get.

Participants spoke enthusiastically about these types of cooperative planning experiences and said that they benefited both the protégé and the mentor.

Just-in-time Support

Having support available when they were ready to try a new idea was important for protégés. Protégé 2 described her experiences with workshops as opposed to having mentoring support:

> Most PD is a variety of workshops. You go and you are bombarded with a million different things and you try to remember them all. You leave and you have no one to ask and you can't even remember some of the great things that you thought you might try. So mentorship, having someone there who can teach you some things you remember, but you can't remember everything so you can go back and ask the person. It just gives you such a sense of freedom and the willingness to try because you know you have help. I guess that's the big thing. You know there is someone there to help you.

Protégé 6 agreed that "immediate feedback is important" and Protégé 7 added that "you do a lot at a workshop, but sometimes they can be too big, or you're too removed from the immediate task at hand." Administrator 1 said, "Onsite is the key and during the days – not having mentoring happening after they [teachers] have taught a full day and going to a workshops where everybody's tired. You release people at their prime time for learning." Having on-site help, as protégés were ready

to implement new ideas, was thought to be successful in helping them integrate technology.

Active, Continuous Learning

Mentoring provided learning that was active, rather than passive. Administrator 3 commented that at workshops, the learners often just receive information, which is not as effective as practicing. Protégés described the kind of learning through mentoring as immediate, and hands-on. Administrator 3 also said, "If they are sitting in a workshop, they are simply passively receiving information from someone they don't know". Administrator 1 commented that mentoring "facilitated continuous learning, whereas you go to a workshop, you are hyped up for three days and everything kind of routine takes over and you're back to square one". Administrator 3 commented that mentors can:

> …walk them [protégés] through it [technology learning] once or twice or three times until they get it, until they reach a comfort level…. You can't go over and over in a workshop. You do it once and it's a one shot thing. It's [mentoring is] just the ability to keep trying and have someone help you troubleshoot sort of thing.

The ability of the mentor to work directly with the teachers and students in a class setting was another example of active learning. Administrator 4 stated:

> …often times what the teacher will do is get the mentor right in his or her class, so not only are the kids learning, but the teacher is learning. So what I think that does is set up an environment that students see that we as teachers also learn, and that learning is, you've always heard that learning is a life-long

activity, and that reinforces it and that puts the student and the teacher at the same level that particular time and the kids think it's really neat.

Needs-driven Learning

Mentors, protégés, and administrators all spoke about the immediate relevance of mentoring. Administrator 3 said that workshops provide "snapshots" and "while they are whetting the interest of a teacher, teachers tend not to use stuff unless it is readily accessible and they can just pick it up and do it." Administrator 4 said, "I think that what tech mentoring does it that you're being mentored on what is relevant to the learner's need". She went on to say:

> You're empowering them to take that back to their classroom to use it, where the other way around, 'we're all going to do spreadsheets. Well, what good is that to me? I don't need that' It becomes a waste of time.

Theme 4: Support for Technology Mentoring Programs

Participants were asked about supports in a technology mentoring program. They discussed administrative support, time, funding, and a supportive environment as keys to program success.

Administrative Support

The administrators interviewed indicated that they themselves, were self-taught technology users, and not terribly technically advanced. Administrator 4 felt that his role was "primarily one of support and making sure they [the mentors] have the resources. Their job is to work with other teachers and work with kids." Administrator 1 agreed and said that her role was that of an encourager, and that she

needed to learn about mentor and protégé needs. Three of the five administrators mentioned that it was important to model the use of technology. Mentor 6 echoed this sentiment by saying that his school administrators "try to model it, which I think is pretty important". All of the administrators said that they had done this through their own participation in school-based technology PD and that they had received support from a technology mentor in some way. The administrators used technology frequently in their work, but applications used were often driven by administrative needs or requirements by their school boards. All of the mentors said that they had received support from their school administration. Mentor 2 acknowledged, "Support of school administration is critical for generating enthusiasm for the program". Mentor 5 agreed and stated, "If you don't have admin behind it, it's not going to happen".

Time

All of the school sites had allocated part of a teacher's full-time equivalent (FTE) towards a technology mentor (see Table 12). Administrator 5 commented on the importance of designating time for a teacher to do mentoring. She said, "I maintain the tech mentoring position. I think it is important I find time." There were many comments echoing the fact that having on-site support during the school day was a key component in their program's success. Protégé 1 commented:

> I have really appreciated the time to learn in this school, not the twenty minutes after school's over when you're trying to think of all the things you have to do before you go home, or the early morning sessions, but actually

having the time off with my colleagues to learn together, and then having the mentor on site to help us if we can't remember some of the things they told us.

This meant that there was a financial commitment by the school to fund this position. Administrators commented that this commitment of finding time more than paid off in rewards for staff and students.

Table 12. Funded Mentoring Time by Site

School	Number of funded mentors (FTE)
Site 1	0.1
Site 2	0.3
Site 3	0.857
Site 4	1.25

Funding

Funding for adequate levels of hardware and software was also seen to be an important support for the programs. One administrator mentioned, however, that there were never enough computers and that the mentors still had more requests than time available. This was seen as both a measure of program success and the desire to have the program continue. Administrators had a difficult time in finding the information breakdown for purchases of hardware, software, and technology professional development. In following up on this information, they stated that it typically involved a very small portion of their school budget (1 to 3%) but that it did take a willingness to set aside money to keep hardware and software current, provide teacher release time, and to fund the technology mentoring position.

Though there was definitely a commitment in terms of finances, the combined money spent on hardware, software, professional development, and mentoring was a small percentage of school budgets. With regard to funding a mentor position, Administrator 5 stated, "I don't think it takes a lot of mentoring. You don't have to have a lot, but it is important to know that someone is there."

Hardware and Software

Another support mentioned was being able to provide learning opportunities for protégés on the same hardware and software that they would be using with students. Mentor 1 explained, "You know exactly how it works," and Mentor 2 added, "Teachers don't need the added anxiety of unfamiliar equipment". Mentor 5 described a scenario that a teacher new to using technology might experience:

> If you are at a workshop and it is being done on a Windows platform and it is just slightly different where you save, and the interface looks slightly different, it is enough to throw somebody who is already taking a risk in their teaching.

Protégé 2 confirmed, "It's nice to be able to do it with the machines that I am going to be taking my students into." Administrator 3 commented "there isn't a huge difference between the two platforms [Windows and Macintosh], but the gap is still pretty wide in the minds of a lot of the teachers". Mentoring provided access to familiar hardware and software, and practice in the same environment that protégés would be using with students. This feature added an extra element of support for novice users.

Troubleshooting

Teachers new to technology often feel that using computers with students is a risk, and having the support of a mentor in the building was thought to provide a "safety net". Mentor 1 articulated, "There were lots of times that people think you know how to do something. Then you realize you're standing in front of a class trying to do it and it's not working". Participants within the mentor, protégé, and administrator groups commented on the importance of having someone available to help protégés troubleshoot during the day.

Environment

Administrators felt that making technology a priority at the school, and creating an environment where collaboration, innovation and risk-taking are encouraged was extremely important. Administrators 1 and 5 said that mentoring created a culture of collaboration that benefited both staff and students. Administrator 1 stated:

> I believe that you tap into the best resources you have, namely people. You acknowledge their strength and I do that in any domain, not only technology. You encourage them to step out of the box and share the knowledge that they have in their strength areas. That's with anyone and I believe that we are all good at something. The key is to find what we are good at and you celebrate that and continue to celebrate it. Celebrate human strengths.

Administrator 5 echoed those comments by saying:

> What it [technology mentoring] does is establish a culture within a school. It's almost automatic that teachers use technology. You know, at one time

> when ICT outcomes were mandated by [the department of education], you were expected to use them, but I think now there is more a culture of, 'What am I going to do? How can I get technology integrated into this particular unit or lesson?'

Mentor 1 commented that "together, there was a learning process. That's why I say a mentor doesn't have to be the all-knowing, sometimes just a co-learner."

Administrator 1 felt that an important mindset of a good mentor is that they are also open to learn things from the protégés. She stated that mentors are "still going to learn from every individual they are interacting with", and that they must be "willing to learn with and learn from the people they are mentoring". Mentor 1 mentioned that she felt that, in many ways, she had benefited from the experience even more than protégés. She said, "As a mentor, you grow a fair amount." Mentor 3 said "It has been a great personal growth experience for myself." Administrators 1 and 4 also reported that their mentoring projects helped to develop a sense of there being a community of learners amongst the staff. Protégé 8 confirmed, "It [the technology mentoring program] built the learning community between staff".

Theme 5: Factors Contributing to the Success of Technology Mentoring Programs

School sites had very informal measures of their technology mentoring program success, but were able to articulate what had changed. They had seen increasing use of technology by staff, increasing demand for computers in their schools, and some changes in perceptions towards using technology in the classroom.

An increase in the number and quality of projects by students and satisfaction of parents with technology learning were also observed. New mentoring opportunities emerged, and staff expressed a desire to have their mentoring programs continue.

Increasing Technology Use by Staff

Mentoring programs were seen to help school staffs use technology more regularly in their teaching. Two administrators told stories of staff whose teaching with technology had increased as a result of the program. Administrator 1 said that prior to the start of their technology mentoring program, two people on a staff of sixteen were integrating technology on a regular basis and that now, one hundred percent of the staff were regular technology users. Of the group who were not using technology at all prior to the program she estimated that approximately five percent of those were very opposed to using technology. She went on to state:

> A huge measure of our success was to have those same people, that five percent who were resisting this, come out of it [the technology mentoring program] after three years and say, 'I love what I am doing and I feel really good about what I have learned and I can't wait to share it with the kids.' They were probably some of the most enthusiastic members of the team…

Administrators were excited to talk about how everyone's expertise had increased and how protégés were becoming increasingly independent in using technology. Mentor 2 stated that the "participation rate in using technology is much higher than it used to be". Protégé 6 declared, "I use IT all the time. I didn't five years ago."

Increasing Demand for Computers

Participants at all four sites mentioned that their computers were being used more often than they were prior to their mentoring program. Administrator 5 stated that there is now a "higher demand for lab space – like we have four labs here and it's like we never seem to have enough." She went on to say:

> [there was an] increase in the number of requests for tech equipment, not necessarily an increase in population, for our student body size hasn't increased but there is definitely a higher demand for the equipment because kids are exploring and learning a lot more.

Administrators 1 and 4, and most of the mentors, noticed an increase in the number of computer lab bookings since the mentoring program began. Administrator 1 described her school's lab by saying that it contained more than thirty current computers and "you couldn't book a time slot because the lab was engaged at all times, so in a small school, that is phenomenal and an excellent measure of success." Administrator 4 also observed that the variety and complexity of hardware the staff and students were using had increased.

All participating schools had invested money over time in computer hardware and software. Three sites had computers on all homeroom teachers' desks. In addition, all four sites had computers available for teacher use only, either in a workroom or department area office, as well as at least one computer lab for students. Administrators indicated that spending on hardware and software was an ongoing process and that effort was taken to keep computers and software up-to-date. The

ratios of computers to students varied quite widely from 1 to 1.8 to 1 to 6.4 as shown in Table 13.

Table 13. Computer-to-Student Ratio by Site

School	Computer-to-student ratio
Site 1	1 : 3.5
Site 2	1 : 6.4
Site 3	1 : 3.5
Site 4	1 : 1.8

Changing Feelings Towards Technology

Several protégés mentioned that their attitude towards using technology had changed since they began receiving support from a technology mentor. Protégé 2 articulated some of the fear that novice users often have. She acknowledged, "I was afraid to try anything in case I wrecked everything." She went on to explain that the biggest benefit for her was "not being afraid to try things with my kids, and that's huge." Protégé 1 echoed, "Well, it's been incredible. I mean, I never thought I would be doing anything on the computer. I was computer illiterate, but now I'm pretty comfortable". Another protégé commented that watching the mentor's own use of technology created interest in it. "I think it took [the mentor] to come here and mentor with somebody else and I got to see that, and that inspired me to work with her". Protégé 6 noted her own growth in saying, "I used it [computers] for report cards and word processing and that was the exact limit of it and then [the mentor] came to our school and then the world opened up and I got to understand that I could do it." Protégé 7 confessed, "I'm 55 and so I thought that it [technology] was for

young people, so I was really excited that I was able to learn it plus I was able to use it."

Increase in Number and Quality of Projects by Students

Administrators and mentors felt that their programs had helped to increase the number and quality of technology projects in their schools. Two administrators noted that students were creating a larger number of projects than before, and they were becoming increasingly complex. Mentor 2 stated, "The quality of work has improved tremendously". She went on to explain that classes were "getting farther and farther away from just using computers for typing". She also noted that prior to their mentoring project, her school had not created Grassroots projects. Grassroots projects are those that have been judged by a provincial panel and that have received cash awards from SchoolNet. With mentoring support, their school alone received $7,200 in Grassroots money in the 2002-2003 school year. This represented ninety percent of the Grassroots awards given to their entire region. Mentor 4 also made a similar point. She said that the number of projects that students were involved in had gone up, and that "everything has expanded so much from just sitting in front of the computer doing 'All the Right Type'" (a keyboarding program). Mentor 5 articulated that he was "seeing people integrate technology into their learning in interesting ways".

Parent Satisfaction

Two administrators noted that parents were highly satisfied with the kinds of technology learning their children were doing. Administrator 2 commented that parents had expressed that they were positive and excited about the kinds of projects

their children were doing with technology. Protégé 1 observed that parents would come to school events and be "blown away with what their little sweethearts could do with a computer". Mentor 1 added, "Parents were very excited about what their kids were learning," and so thrilled that they had donated money from the school council to extend the school's hardware and software purchases.

New Mentoring Opportunities

An unanticipated part of schools' successes was the emergence of new mentors who often developed an interest and expertise in a particular application. For example, one teacher who had formerly not been a user of technology became the digital camera expert in the school and offered support to other teachers. Administrator 5 noted, "It [technology mentoring] doesn't have to be one person's job. Teachers help each other more and that's beneficial." Protégé 3 noted that she had only used technology for some personal productivity tasks like word processing. She said, "Now I do mentoring with others as well, and went on to say, "People see what I do and will ask me specific questions on that". Mentor 5 said that his former protégés formed a "mentoring database, mentoring other people in the stuff [the skills] they originally came and got help from." He added, "It [the technology mentoring program] started with two of us, [the other mentor and I] mentoring and I noticed last year out of a staff of thirty some-odd people, there was as many as fifteen people doing mentorship at some level." Two school sites mentioned that other schools and districts were attempting to replicate their successful technology mentoring programs.

In these environments of learning, student skills were seen as assets and students were encouraged to support each other, as well as share their knowledge with teachers. Several mentors and protégés commented that students help each other in informal ways, and two mentors described more formalized student mentoring initiatives. Mentor 2 remarked, "Our school is beginning to train student technology mentors".

Desire for the Program to Continue

Participants mentioned that there had been an expressed desire to have their mentoring programs continue. Mentor 1 said that the mentoring program was a "priority with them [the staff] and they want to see it carry on." Mentor 4 also observed that teachers are "anxious for it to continue." She continued that they "certainly see the validity of it and why it is needed and that it is needed." Mentor 2 commented," Teachers are absolutely enthused about our mentoring project". Administrators and mentors both mentioned that there continued to be a large number of requests for mentor support, which indicated to them that the program was both necessary and successful. Administrator 2 observed that their school's mentor continues to receive more requests that she can handle.

Two protégés mentioned that they felt that an important step in the mentoring process was to wean support from learners somewhat. Protégé 6 remarked, "It's important that a mentor is eventually able to cut their ties with who they're mentoring. Not totally – I don't think it's a total thing." Protégé 1 also commented that it is a good idea to "wean off from mentoring". They felt there was a need for the protégés to be able to carry on, on their own.

CHAPTER V: DISCUSSION

This purpose of this study was to determine the characteristics of successful technology mentoring programs. Discussion of this research will be done by looking at mentoring as a model of professional development for advancing technology integration, and the characteristics of the programs examined that participants felt contributed to their success. Research related to these ideas will also be examined. This chapter will conclude with implications for further studies and a final summary.

Mentoring as a Model for Professional Development

Participants felt that mentoring was an effective model for technology professional development. They discussed the value of the relationships that developed, the cooperative planning that took place, the just-in-time support, and needs-driven learning. Researchers agree that mentoring is an effective tool. A study by Franklin et al., (2001) states that, "As a professional development model, mentoring has the advantage of addressing individual needs while providing guidance in planning, implementation and support for teachers in the classroom" (p. 27). Protégés voiced how they valued having ongoing support, and how it enabled them to implement new strategies immediately. Research has acknowledged that the workshop model doesn't allow the opportunity to practice new skills, and without practice, there is often no lasting transfer of new skills to teacher practice (McKenzie, 1991). Effective professional development situates learning in authentic classroom

practice (Swan, Holmes, Vargas, Sybillyn, Meier, & Rubenfeld, 2002), which is what technology mentoring allowed the participants to do.

Characteristics of Successful Technology Mentoring Programs

The schools studied had many similarities in the way they carried out their mentoring programs, and there were several areas that were critical for the success of their programs. Having supportive administrators helped to establish programs by providing time, providing funding for mentoring, and ensuring an adequate amount of hardware and software. Mentors helped to create effective programs by developing relationships, participating in cooperative planning with protégés, and providing just-in-time support. All of these components were supported with discussions and an understanding of the teaching and learning process. Both administrators and mentors were seen as important in helping to create a learning environment in the school.

Supportive Administrators

Mentors in this study named administrators as people key to their program's success. Typically, school administrators were not the people in the building with the greatest expertise in using technology, but they saw the importance of using technology with students. They committed financial resources for releasing mentors and teachers, as well as providing adequate hardware and software. Research has also supported the importance of having supportive administrators in advancing technology in schools. Kincaid (2002) stated that, "principal leadership has been described as one of the most important factors affecting the effective use of technology in classrooms". Brand (1997) discusses this administrative support by

saying that "If the technological development of teachers is to truly be effective, administrators must not simply pay lip service to the cause. They must take supportive action." He goes on to describe how administrators can help by: establishing flexible schedules, encouraging coaching and team teaching, allowing time for teachers to observe each other and to plan and evaluate integration. The administrators at the sites studied had taken these types of actions in supporting their technology mentoring programs.

Providing Time

The sites studied had invested in a technology mentoring program over a period of time. The literature reinforces the importance of allowing a program to grow, and mentoring relationships to develop. The "successful mentor makes a personal commitment to be involved with another person for an extended period of time. Time involves commitment and dedication demonstrated by the mentor's accessibility which allows the relationship to become a seamless part of the learning culture." (Young & Wright, 2001 p. 204).

In addition to having time to develop such a program, all three groups interviewed spoke of the importance of having mentors available during the day. Teachers are often expected to engage in professional development activities during their personal time, which is an additional barrier to those who are already reluctant to use technology (McKenzie, 1991). Other studies have shown that time constraints continue to be a leading barrier in the integration of technology in the classroom (Brand, 1997; Wiburg, 1997). All three groups interviewed spoke about the effectiveness of working with colleagues during the school day, as opposed to other

times when teachers are exhausted (e.g. after school). Swan et al., in a 2002 study, found that:

> ...the closer trainings come to the space and time of the classroom, the more likely they are to result in technology integration; it also seems clear that any training so removed encourages teachers to think of technology as removed. Professional development that takes place outside the classroom does little to model technology integration. (p. 196)

Other researchers have found that participants feel that programs which provide for release time and learning during the work day make a statement about the significance of the trainee's time and importance of the learning (Rowley, 1999).

Protégés interviewed commented that having release time during the day provided them with opportunities to watch mentors engage in model lessons with students. It also allowed them to participate in collaborative activities that helped them to see how technology could be integrated.

Funding for Mentoring

Related to providing time is the funding that is required to release mentors to work with colleagues. There was a commitment by the participating schools to fund a mentoring position. The literature says that professional development for advancing technology requires an adequate investment of money (Carvin, 1999; McKenzie, 1991). The administrators involved in this study agreed with the research that indicates that though funding is required, mentoring is a cost-effective approach in making significant changes in technology integration (McKenzie, 1991; Pittenger & Heinmann, 2000).

Adequate Hardware and Software

A support that may seem obvious, but was important to the success of the programs studied, was having adequate access to hardware and software. The schools involved reflected a range of computer-to-student ratios, and different numbers of computers were available for staff use. The administration had made a financial commitment to keep technology as current as possible. Swan et al. (2002) state that, "Even the best professional development programs cannot make up for a lack of access to computer and relevant software at the school" (p. 195).

Protégés valued the opportunity to learn using the same equipment that they would be using with their students. Several mentors and administrators commented that this was an extra support that was important for novice users. Research asserts that there is a greater likelihood of technology integration happening when teachers learn with the applications and machines at their own school (Swan et al, 2002).

Mentors

Administrators, protégés, and mentors all said that having an effective mentor was a key to the success of their programs. The research also speaks strongly about the significance of the mentor. Research recognizes that mentors must have strong interpersonal skills (Britnor Guest, 1999; Pittenger & Heinmann, 2000; Rowley, 1999). Participants in the study echoed this sentiment. As well, they frequently acknowledged the importance of patience and empathy. The literature also supports the notion that mentors must have patience when dealing with anxious learners and be able to provide appropriate pacing in their support. This can help protégés to keep moving ahead with their skills without becoming frustrated (Kerka, 1998; McKenzie,

1991). Participants cited flexibility among the qualities of an effective mentor due to the many different types of mentoring situations encountered. Research by Swan et al. (2002) supports this idea:

> Flexibility and adaptability were found to be central to best practices in mentoring. Mentors' ability to work with variations in teacher learning styles, pedagogical approaches, and prior experiences, as well as with existing school technology resources were found to significantly influence technology integration in schools and classrooms. (p. 200)

Mentors in this study were also seen to be enthusiastic and committed to seeing that technology is integrated throughout the curriculum. Passion was a word mentioned frequently. Effective mentors have a belief that their efforts will make a significant impact on others (Rowley, 1999).

Development of Relationships

Protégés and mentors often referred to mentoring as a relationship building activity rather than merely a skill transferring process. They often mentioned the importance of personal comfort and friendship. The importance of the mentor/protégé relationship is echoed in literature as well. For example, Bokeno and Gantt (2000) found that "the diffusion of learning in organizations becomes a matter of relationships among learners, where the relationships are what is practiced and the learning is what happens rather than the other way around." (p. 241). Another researcher found that the "benefits of mentoring relationships extend to organizations as well, when they create stronger connections among organizational members"

(Nemanick, 2000). The development of such relationships was seen to be an important characteristic of an effective program.

Cooperative Planning

Having release time during the school day enabled teachers to plan cooperatively. It also allowed mentors to help their protégés decide where technology integration could best be applied to enhance the curriculum. Mentors were seen as having the technical knowledge to complement the curricular expertise of protégés. A study by Swan et al. (2002) described the benefits of such cooperative planning in technology mentoring relationships:

> Often mentors model best practices in computer-based teaching and learning by taking the lead in implementing jointly created lessons. They then guide teachers in designing and implementing their own computer-based lessons, gradually fading their support as teachers become more confident in the use of electronic technologies. (p. 193)

Other related literature talks about how the mentoring model enables colleagues to jointly create and implement lessons. This collaborative approach helps protégés to gain confidence while gradually requiring less support (Franklin et al., 2001; Rowley, 1999).

Just-in-time Support

A common barrier to technology use is that teachers are either fearful that they will damage a machine or that they will get to the computer lab with their students

and not be able to make the technology work properly. Participants commented on the importance of having the support of an in-house mentor who could be called upon to give advice "on the fly" or be of immediate assistance should technology activities not go as planned. Franklin et al. (2001) noted that mentors can provide technical support during the mentoring partnership and teach teachers how to troubleshoot their own machines. Swan et al. (2002) discovered that protégés felt a sense of security in using technology with the presence of a mentor a "because they know the mentors are there to help out if they get in trouble". The perceived fear that one protégé articulated about "breaking something" seemed to be somewhat assuaged by having a colleague who could offer immediate support. McKenzie (1991) supports this idea:

> ...teachers should have ample opportunity to practice the skills in relative controlled and safe environments until a significant degree of confidence and "executive control" has been acquired." (p. 3)

Research supports the notion that that both formal and informal mentoring relationships benefit organizations (O'Reilly, 2001; Pittenger & Heinmann, 2000).

Creating a Learning Environment

Protégés in this study stressed the fact that their mentors did not simply impart knowledge. Instead, they spoke of relationships that developed in which mentor and protégé learned from each other. Several mentors and administrators mentioned that an important quality for mentors to have was a willingness to learn from protégés. Those who have researched mentoring have also found that effective mentoring often involves creating this kind of learning environment. One study observed that "the

mentor also has an opportunity to reflect on his or her own practice of teaching with technology" (Mumbi, Franklin, & Duran, 2001). Bokeno and Gantt (2000) felt that conventional mentoring tended to be more unilateral, where the mentor's main purpose was to impart knowledge to the protégé, but that a more collaborative form of mentoring "celebrates equity of voice" (p. 245). Several mentors and administrators mentioned that their technology mentoring programs helped to create a community of learners within their school. The comments of the participants confirmed that having a mentoring program helped them to feel that learning was valued. As Bokeno and Gant (2000) state, "Mentoring is a learning pursuit" (p. 242).

Implications for Future Studies

A future study could focus on emerging forms of mentoring that exploit telecommunications (e.g., web boards or email). There are several teachers' organizations as well as private companies undertaking such ventures. It would also be interesting to analyze the effectiveness of using students as technology mentors. Several participants in this study mentioned this emerging practice. A more complex study, but one that would be interesting, would be the relationship between technology mentoring programs and the number of hours teachers spend in technology integration activities. Participants in this research described their mentoring programs as evolving, and future research could study the stages of development of such programs.

Conclusion

In examining the models and experiences of participants in various successful models of mentoring at four different sites, one is able to gain a deeper understanding of how this type of professional development may help schools to bring all staff to a place where they are comfortable in integrating technology outcomes in their teaching. Technology mentoring programs are an example of professional development that uses the expertise of site-based leaders in building a community of professionals excited about using technology as an effective tool for teaching and learning. Participants in this study were certainly enthusiastic about sharing their journey in using technology with students, and the relationships that evolved through the programs.

Administrators, mentors, and protégés all indicated that mentoring as a model of professional development was beneficial in helping their staff become more comfortable in using technology more regularly and more effectively with students. While the levels of expertise in using technology continued to vary among staff members, mentoring led to a much larger number of teachers who regularly integrated technology into their teaching. As well, there was an increase in the quality of projects in the schools that had support for teachers through technology mentoring.

In several cases, the use of technology also increased the capacity for technology leadership in the schools, and in fact, several protégés became mentors themselves after receiving support for a period of time. Technology mentoring programs can also enhance technology leadership in schools.

The mentoring programs evolved in a variety of ways, but the participants indicated that it took time and effort for effective mentoring programs to be established. This fact was also reinforced in the literature (Kuo, 2000). This would seem to indicate that a mentoring program should be given a period of sustained time, effort and funding in order to see technology integrated effectively by the majority of teachers in a school.

In conclusion, the purpose of this study was to examine the characteristics of successful technology mentoring programs. The programs examined had many similar qualities and the staff interviewed felt strongly that mentoring enabled them to integrate technology more effectively throughout the curriculum.

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APPENDIX A: Interview Consent Form

I, _____, hereby consent to be interviewed by Joni Turville.

I understand that:

- I may withdraw from the research at any time without penalty.
- All information gathered will be treated confidentially and discussed only with Joni Turville's thesis advisor.
- Any information that identifies myself will be destroyed upon completion of this research and
- I will not be identifiable in any documents resulting from this research.

I also understand the results of this research will be used only in the following:

- Research thesis and
- Presentations and written articles for other educators

Signature: _____

Date Signed: _____

For further information concerning the completion of this form, please contact Joni Turville at joniturville@telusplanet.net or turvillej@spschools.org.

APPENDIX B: Permission Letter to Superintendents

114 Dorchester Drive
St. Albert, Alberta
T8N 4Y4

March 12, 2003

Dear,

My name is Joni Turville and I am currently pursuing a Masters degree in Instructional Technology at the University of Alberta. I am writing to request permission to involve one of your schools in a research project entitled "Characteristics of Successful Technology Mentoring Programs for the Advancement of Technology Professional Development in Educational Technology." Specifically, my research will focus on the experiences of mentors, protégés, and administrators who are members of the SchoolNet Network of Innovative Schools, which includes a school in your district,

It is widely recognized that staff development is critical to the effective integration of technology into teaching and learning. Mentoring is one strategy through which this goal can be achieved. Thus, the major purpose of my research is to describe several models of technology mentoring and to identify those characteristics that are consistent with their success including the type of training and support that are required.

Involvement in this research will entail the completion of a brief online survey and participation in an interview. Interviews will be recorded for future transcription and analysis and will be conducted either in person or by telephone.

Information gathered through this research will be used to develop a research thesis in partial fulfilment of the requirements for a Masters Degree in Education. As well, findings may be used to support the development of research publications and reports to key stakeholders in the field of education. All information provided by participants will be considered to be confidential and anonymity will be preserved. Aliases will be used in all reporting – neither participants nor their schools will be specifically identified. A summary of the research findings will be made available to all participants upon request.

If you require further information, please contact me at (780) 458-1630, (780) 460-3712 or turvillej@spschools.org. I look forward to receiving your response and thank you for your consideration.

Sincerely,

Joni Turville
Instructional Technology Graduate Student
University of Alberta

APPENDIX C: Permission Letter to Principals

114 Dorchester Drive
St. Albert, Alberta
T8N 4Y4

March 12, 2003

Dear,

My name is Joni Turville and I am currently pursuing a Masters degree in Instructional Technology at the University of Alberta. I am writing to invite you to participate in a research project entitled "Characteristics of Successful Technology Mentoring Programs for the Advancement of Technology Professional Development in Educational Technology." Specifically, my research will focus on the experiences of mentors, protégés and administrators who are members of the SchoolNet Network of Innovative Schools, which includes your school,

It is widely recognized that staff development is critical to the effective integration of technology into teaching and learning. Mentoring is one strategy through which this goal can be achieved. Thus, the major purpose of my research is to describe several models of technology mentoring and to identify those characteristics that are consistent with their success including the type of training and support that are required.

Involvement in this research will entail the completion of a brief online survey and participation in an interview. Interviews will be recorded for future transcription and analysis and will be conducted either in person or by telephone.

Information gathered through this research will be used to develop a research thesis in partial fulfilment of the requirements for a Masters Degree in Education. As well, findings may be used to support the development of research publications and reports to key stakeholders in the field of education. All information provided by participants will be considered to be confidential and anonymity will be preserved. Aliases will be used in all reporting – neither participants nor their schools will be specifically identified. A summary of the research findings will be made available to all participants upon request.

Your experiences as an administrator in a successful mentoring program will contribute significantly to this research and your involvement would be greatly appreciated. If you agree to participate, please complete and sign the attached Research Consent Form. This research project has been reviewed and approved by the Department of Educational Psychology's Research Ethics Committee. Participants may withdraw from the research at any time.

If you require further information, please contact me at (780) 458-1630, (780) 460-3712 or turvillej@spschools.org. I look forward to receiving your response and thank you for your consideration.

Sincerely,

Joni Turville
Instructional Technology Graduate Student
University of Alberta

APPENDIX D: Permission Letter to Mentors

114 Dorchester Drive
St. Albert, Alberta
T8N 4Y4

March 12, 2003

Dear,

My name is Joni Turville and I am currently pursuing a Masters degree in Instructional Technology at the University of Alberta. I am writing to invite you to participate in a research project entitled "Characteristics of Successful Technology Mentoring Programs for the Advancement of Technology Professional Development in Educational Technology." Specifically, my research will focus on the experiences of mentors, protégés and administrators who are members of the SchoolNet Network of Innovative Schools, which includes your school,

It is widely recognized that staff development is critical to the effective integration of technology into teaching and learning. Mentoring is one strategy through which this goal can be achieved. Thus, the major purpose of my research is to describe several models of technology mentoring and to identify those characteristics that are consistent with their success including the type of training and support that are required.

Involvement in this research will entail the completion of a brief online survey and participation in an interview. Interviews will be recorded for future transcription and analysis and will be conducted either in person or by telephone.

Information gathered through this research will be used to develop a research thesis in partial fulfilment of the requirements for a Masters Degree in Education. As well, findings may be used to support the development of research publications and reports to key stakeholders in the field of education. All information provided by participants will be considered to be confidential and anonymity will be preserved. Aliases will be used in all reporting – neither participants nor their schools will be specifically identified. A summary of the research findings will be made available to all participants upon request.

Your experiences as a mentor in a successful mentoring program will contribute significantly to this research and your involvement would be greatly appreciated. If you agree to participate, please complete and sign the attached Research Consent Form. This research project has been reviewed and approved by the Department of Educational Psychology's Research Ethics Committee. Participants may withdraw from the research at any time.

If you require further information, please contact me at (780) 458-1630, (780) 460-3712 or turvillej@spschools.org. I look forward to receiving your response and thank you for your consideration.

Sincerely,

Joni Turville
Instructional Technology Graduate Student
University of Alberta

APPENDIX E: Permission Letter to Protégés

114 Dorchester Drive
St. Albert, Alberta
T8N 4Y4

March 12, 2003

Dear,

My name is Joni Turville and I am currently pursuing a Masters degree in Instructional Technology at the University of Alberta. I am writing to invite you to participate in a research project entitled "Characteristics of Successful Technology Mentoring Programs for the Advancement of Technology Professional Development in Educational Technology." Specifically, my research will focus on the experiences of mentors, protégés and administrators who are members of the SchoolNet Network of Innovative Schools, which includes your school,

It is widely recognized that staff development is critical to the effective integration of technology into teaching and learning. Mentoring is one strategy through which this goal can be achieved. Thus, the major purpose of my research is to describe several models of technology mentoring and to identify those characteristics that are consistent with their success including the type of training and support that are required.

Involvement in this research will entail your participation in an interview. Interviews will be recorded for future transcription and analysis and will be conducted either in person or by telephone.

Information gathered through this research will be used to develop a research thesis in partial fulfilment of the requirements for a Masters Degree in Education. As well, findings may be used to support the development of research publications and reports to key stakeholders in the field of education. All information provided by participants will be considered to be confidential and anonymity will be preserved. Aliases will be used in all reporting – neither participants nor their schools will be specifically identified. A summary of the research findings will be made available to all participants upon request.

Your experiences as a protégé in a successful mentoring program will contribute significantly to this research and your involvement would be greatly appreciated. If you agree to participate, please complete and sign the attached Research Consent Form. This research project has been reviewed and approved by the Department of Educational Psychology's Research Ethics Committee. Participants may withdraw from the research at any time.

If you require further information, please contact me at (780) 458-1630, (780) 460-3712 or turvillej@spschools.org. I look forward to receiving your response and thank you for your consideration.

Sincerely,

Joni Turville
Instructional Technology Graduate Student
University of Alberta

APPENDIX F: Mentor Survey (online)

Technology Mentoring Programs
Mentor Survey

Purpose: This project is entitled "Characteristics of Successful Technology Mentoring Programs for the Advancement of Technology Professional Development in Educational Technology: and is being undertaken as the researcher's masters thesis in Instructional Technology. The major purpose of this research is to describe several models of technology mentoring and to identify those characteristics that are consistent with their success including the type of training and support that are required. Findings may be used to support the development of research publications and reports to key stakeholders in the field of education.

Confidentiality: All information provided by participants will be considered to be confidential and anonymity will be preserved. Aliases will be used in all reporting – neither participants nor their schools will be specifically identified.

Participant Rights: Participants may withdraw from the research at any time and not be reported in the results.

This study has been reviewed and approved by the Research Ethics Board of the Faculties of Education and Extension at the University of Alberta. For questions regarding participant rights and ethical conduct of research, contact the Chair of the Research Ethics Board at (780) 492-3751.

Thank you for participating in this survey.

Joni Turville
Graduate Student, Instructional Technology
joniturville@telusplanet.net

Participant Code: ____

Mentoring - Time

1. How long have you been a technology mentor in your school?

Mentoring designation	**Time in years and months (e.g., 2 years, 3 months)**
In a **formal capacity** (i.e., you have designated release time to do mentoring and/or coordination of technology at your school)	
In an **informal capacity** (i.e., you have provided support to staff without having a title, designated time, etc.)	
Total time	

2. How much assigned time do you have as a technology mentor?

- Express from 0.1 to 1.0 of a full-time teacher equivalent (F.T.E.).

3. How do teachers request mentoring support? (Check all that apply)

_____ in writing, using a form, email, etc.

_____ during a staff meeting or other meeting time (specify) _____

_____ asking informally (in staff room, hallway, etc.)

4. Is mentoring available to all teachers and if not, on what basis are they eligible?

5. When do these mentoring activities take place? (Check all that apply)

_____ during release time provided to the mentor during the school day

_____ before school

_____ at lunch

_____ after school

_____ during staff meetings

_____ during professional development days

_____ other (specify) _____

Mentoring Duties/Role

1. **What do your technology mentoring duties include? (Check all that apply)**

_____ working one-on-one with teachers

_____ working with teachers and their students during class time

_____ working with small groups of teachers

_____ working with a whole school staff

_____ planning for mentoring activities

_____ ordering hardware/software

_____ developing plans for technology integration

_____ providing technical support of hardware and/or software

_____other (specify) _____

Time Spent on Mentoring

1. **How much time do you spend per month/year in these mentoring activities?**

Activity	Time per month (in hours)	Total time per year (in hours)
Working one-on-one with teachers		
Working with teachers and their students during class time		

Activity	Time per month (in hours)	Total time per year (in hours)
Working with small groups of teachers		
Working with whole school staff		
Planning for mentoring activities		
Ordering hardware/software		
Developing plans for technology integration		
Providing technical support of hardware and/or software		
Other (specify)		

Mentoring Groups of Teachers

1. Check the frequency with which you do mentoring with groups of teachers on the use of computer hardware:

Hardware	Never	Rarely (1-2 group mentoring sessions per year)	Sometimes (3-4 group mentoring sessions per year)	Frequently (5 or more group mentoring sessions per year)
Printers				
Scanners				
Digital cameras				
Digital video cameras				

2. Check the frequency with which you do mentoring with groups of teachers on the use of software tools:

Software Tools	**Never**	**Rarely** (1-2 group mentoring sessions per year)	**Sometimes** (3-4 up mentoring sessions per year)	**Frequently** (5 or more group mentoring sessions per year)
Operating system (e.g., basic use of Windows)				
Word processors				
Databases				
Spreadsheets				
Presentation software (e.g., Hyperstudio, PowerPoint, KidPix)				
Draw/paint/photo (e.g., Photoshop)				
Video Editing (e.g., iMovie)				
Web page creation (e.g., Dreamweaver, Front Page)				
Instructional support (e.g., marks or attendance programs)				
File transfer programs (e.g., Fetch)				

3. Check the frequency with which you do mentoring with groups of teachers on the use of communication tools:

Communication Tools	**Never**	**Rarely** (1-2 group mentoring sessions per year)	**Sometimes** (3-4 group mentoring sessions per year)	**Frequently** (5 or more group mentoring sessions per year)
Email				
Online collaborative projects				
Videoconferencing				

4. Check the frequency with which you do mentoring with groups of teachers on information access and retrieval:

Information access and retrieval	**Never**	**Rarely** (1-2 group mentoring sessions per year)	**Sometimes** (3-4 group mentoring sessions per year)	**Frequently** (5 or more group mentoring sessions per year)
File management (local and network)				
Internet research				
CD ROM research				

5. Check the frequency with which you do <u>one-on-one mentoring</u> with teachers on the use of computer <u>hardware</u>:

Hardware	**Never**	**Rarely** (1-2 one-on-one mentoring sessions per year)	**Sometimes** (3-4 one-on-one mentoring sessions per year)	**Frequently** (5 or more one-on-one mentoring sessions per year)
Printers				
Scanners				
Digital cameras				
Digital video cameras				

6. Check the frequency with which you do mentoring with <u>one-on-one mentoring</u> on the use of <u>software</u> tools:

Software Tools	**Never**	**Rarely** (1-2 one-on-one mentoring sessions per year)	**Sometimes** (3-4 one-on-one mentoring sessions per year)	**Frequently** (5 or more one-on-one mentoring sessions per year)
Operating system (e.g., basic use of Windows)				
Word processors				
Databases				
Spreadsheets				
Presentation (e.g., Hyperstudio, PowerPoint, KidPix)				

Software Tools	**Never**	**Rarely** (1-2 one-on-one mentoring sessions per year)	**Sometimes** (3-4 one-on-one mentoring sessions per year)	**Frequently** (5 or more one-on-one mentoring sessions per year)
Draw/Paint/ Photo (e.g., Photoshop)				
Video editing (e.g., iMovie)				
Web page creation (e.g., Dreamweaver, Front Page)				
Instructional support (e.g., marks or attendance programs)				
File transfer programs (e.g., Fetch)				

7. Check the frequency with which you do mentoring with <u>one-on-one mentoring</u> on the use of <u>communication</u> tools:

Communication Tools	**Never**	**Rarely** (1-2 one-on-one mentoring sessions per year)	**Sometimes** (3-4 one-on-one mentoring sessions per year)	**Frequently** (5 or more one-on-one mentoring sessions per year)
Email				
Online collaborative projects				
Videoconferencing				

8. Check the frequency with which you do mentoring with <u>one-on-one mentoring</u> on the use of information access and retrieval:

<u>Information Access and Retrieval</u>	**Never**	**Rarely** (1-2 one-on-one mentoring sessions per year)	**Sometimes** (3-4 one-on-one mentoring sessions per year)	**Frequently** (5 or more one-on-one mentoring sessions per year)
File management (local and network)				
Internet research				
CD ROM research				

Thank you for completing this survey. By clicking the submit button, you signify that you agree to have your data used as part of this thesis research

Submit

APPENDIX G: Administrator Survey (online)

Technology Mentoring Programs
Administrator Survey

Purpose: This project is entitled "Characteristics of Successful Technology Mentoring Programs for the Advancement of Technology Professional Development in Educational Technology: and is being undertaken as the researcher's masters thesis in Instructional Technology. The major purpose of this research is to describe several models of technology mentoring and to identify those characteristics that are consistent with their success including the type of training and support that are required. Findings may be used to support the development of research publications and reports to key stakeholders in the field of education.

Confidentiality: All information provided by participants will be considered to be confidential and anonymity will be preserved. Aliases will be used in all reporting – neither participants nor their schools will be specifically identified.

Participant Rights: Participants may withdraw from the research at any time and not be reported in the results.

This study has been reviewed and approved by the Research Ethics Board of the Faculties of Education and Extension at the University of Alberta. For questions regarding participant rights and ethical conduct of research, contact the Chair of the Research Ethics Board at (780) 492-3751.

Thank you for participating in this survey.

Joni Turville
Graduate Student, Instructional Technology
joniturville@telusplanet.net

Participant Code: _____

Demographics

1. What grades are taught in your school?

- ❑ K
- ❑ 1
- ❑ 2
- ❑ 3
- ❑ 4
- ❑ 5
- ❑ 6
- ❑ 7
- ❑ 8
- ❑ 9
- ❑ 10
- ❑ 11
- ❑ 12

2. How many teachers do you have on staff? (include all full and part time teachers)

3. How many full time equivalent teachers do you have on staff?

4. How many computers in your school are designated for teacher use only?

5. Where are computers for teacher use located? Check all that apply.

- ❑ on teachers' desks
- ❑ in the staff lounge
- ❑ in the teacher workroom
- ❑ in the library
- ❑ Other (specify)_____

6. How many computers do you have <u>for student use</u> that are 4 years old or newer, and have internet access?

7. Of these, how many are:

a) In the library?

b) In classrooms?
c) In computer labs?
d) Other (specify)

Mentoring

1. How long have you had a mentoring program in place at your school?
____ years ___ months

2. Have you, personally, participated in technology mentoring at your school in the last year?

- ☐ Yes
- ☐ No

3. If you responded yes to #2, please describe the activities in which you participated.

4. How many teachers at your school integrate technology in their teaching on a regular basis (at least once per month)?

Funding

1. Approximately how much money per year does your school spend on computer hardware?

2. Approximately how much money per year does your school spend on computer software?

3. Approximately how much money per year does your school spend on technology mentoring activities?

4. Approximately how much money per year does your school spend on technology professional development (e.g., workshops, conferences) in a year?

Thank you for completing this survey. By clicking the submit button, you signify that you agree to have your data used as part of this thesis research

Submit

APPENDIX H: Mentor Interview

Technology Mentoring Programs

Mentor Interview Questions

Background Information

1. **Describe your education and background in using technology.**

- A self-taught computer user
- Some workshops or courses
- A college degree or certificate in technology
- A university certificate or degree in technology
- Experience (i.e., how long have you been working with technology?)

Planning

1. **How does your school plan for technology professional development at your school?**

- Long range (3-5 year) technology plans
- Yearly technology plans
- Whole staff involvement in deciding upon goals
- Small committee of volunteers to decide upon goals and present to staff
- One or two people create technology plans and goals
- Administration involvement in planning
- Consideration of provincial ICT outcomes
- Tied to student outcomes and curricular learning
- Based on identified teacher and student needs
- Through the professional growth plan process

2. **Why did your school decide upon a mentoring program as opposed to other models of professional development?**

- Lack of success with other methods
- Success with mentoring in other contexts
- Expertise in the school
- Ongoing assistance available for protégés
- Learning for both mentor and protégé
- On-site assistance using school's hardware/software
- Building of collegial relationships among staff members
- Encouragement of leadership

3. **What are the goals of your mentoring program?**

- Well defined versus loosely formed goals
- Helping all staff be prepared to integrate ICT outcomes
- Developing relationships between staff members
- Helping staff use technology effectively with students
- Collaborative planning

Defining Mentoring and its Role

1. **How would you define mentoring? What does it mean to you?**

- Collaborative planning
- Discussing protégé needs
- Support for technology integration into the curriculum with teachers
- Sharing new and changing information with teachers
- Collegial support
- Shared inquiry
- Handholding and ongoing support
- Just in time support

2. **What are the qualities of a good mentor?**

- Enthusiastic about technology
- Respected teacher
- Supportive
- Ability to empathize with new learners
- Flexible
- Ability to foster risk-taking
- Vision for technology integration
- Strong interpersonal skills

- Ability to work effectively with adult learners
- Not necessarily a technician or someone who "knows it all"

3. Which of these characteristics are most important and why?

4. What kinds of people in the school do you mentor and what types of mentoring activities do you with each group?

- Teachers new to using technology
- Experienced technology users
- Administrators
- Support staff

5. Please comment on how mentoring as a model of professional development is beneficial in comparison to other types of professional development (e.g., workshops, courses, teachers' convention)

- on-site support
- use of own equipment and software
- understanding of student population and school culture
- opportunities for informal mentoring

Success of the Program

1. What are the indicators of the success of your school's technology mentoring program, and how do you measure them (or what are the characteristics of its success)?

- Teachers using technology more for personal use (e.g., report cards, email, word processing)
- Teachers that formerly were not using technology with students are now using it
- Teachers using technology more frequently with students
- Teachers doing increasingly more complex activities with students
- Increased (or lessening) demand for mentoring time and support
- Increasingly complex questions and projects with mentor
- Increased use of computers in the school
- Formerly novice teachers now providing leadership to others

2. **Please give specific examples of how your work as a mentor has helped teachers in your school to more effectively use technology with their students.**

- Students engaged in using technology in effective ways (more than just drill and practice)
- Students engaged in problem solving and data management with technology tools
- Participation in effective communication using technology (e.g., email, online discussion groups, online communication projects)
- Increased use and effectiveness in searching and synthesizing electronic information
- Participation and creation of online projects
- Increasingly creative use of technology (e.g., video creation, music, multimedia etc.)
- Technology use is more visible in the school

3. **What specific feedback have teachers given to you regarding your technology mentoring program?**

- Teachers express a desire for it to continue
- Technology integration would not have happened for some without mentoring support
- They describe where they began with technology and how the mentoring program has helped them to move ahead
- Increased comfort level/confidence with technology

4. **One of the purposes of this research is to identify how and when mentoring is most useful. Can you detail one (or more) specific example(s) where mentoring has led to an exemplary project for students or a change in a teacher's use of technology with students?**

Support

1. **From whom or from where do you receive support for your role as a mentor?**

- School administration
- District administration
- School or district technician
- District technology coordinator or curriculum coordinator
- Provincial department of learning
- Professional organizations
- Teachers
- Parents

2. What form does this support take?

- Positive verbal or written feedback from administrators and teachers
- Participation in mentoring activities
- Funding for release time for mentoring
- Release time as needed for other related mentoring or technology coordination duties
- Recognition of initiatives
- Communication of information
- Availability of professional development activities
- Funding for own professional development

Conclusion

1. Is there anything else at all that you would like to share with me about your role as a mentor?

APPENDIX I: Administrator Interview

Technology Mentoring Programs

Administrator Interview Questions

Background Information

1. Describe your education and background in using technology.

- A self-taught computer user
- Some workshops or courses
- A college degree or certificate in technology
- A university certificate or degree in technology
- Experience (i.e., how long have you been using technology?)

Mentoring

1. How did you select your technology mentors?

- formal process – applications/interview
- emergence of situational leadership
- informal request by administration
- informal request by staff

2. What qualities do your mentors possess that make them effective?

- Enthusiastic about technology
- Respected teacher
- Supportive
- Ability to empathize with new learners
- Flexible
- Ability to foster risk-taking
- Vision for technology integration
- Strong interpersonal skills
- Ability to work effectively with adult learners
- Not necessarily a technician or someone who "knows it all"

3. What are the indicators of the success of your school's technology mentoring program, and how do you measure them (or what are the characteristics of its success)?

- Teachers using technology more for personal use (e.g., report cards, email, word processing)
- Teachers that formerly were not using technology with students are now using it
- Teachers using technology more frequently with students
- Teachers doing increasing complex activities with students
- Increased (or lessening) demand for mentoring time and support
- Increasingly complex questions and projects with mentor
- Increased use of computers in the school
- Formerly novice teachers now providing leadership to others

4. Please comment on how mentoring as a model of professional development is beneficial in comparison to other types of professional development (e.g., workshops, courses, teachers' convention)

- on-site support
- use of own equipment and software
- understanding of student population and school culture
- opportunities for informal mentoring

Support

1. How do you support technology mentoring at your school?

- financial support for hardware and software
- release time for mentors
- release time for teachers
- attendance at workshops
- encouragement and recognition of technology initiatives

Conclusion

1. Is there anything else at all that you would like to share with me about your role as an administrator in supporting technology mentoring and technology integration at your school?

APPENDIX J: Protégé Interview

Technology Mentoring Programs

Protégé Interview Questions

Mentoring

1. How does your technology mentoring program help you integrate technology throughout the curriculum?

- Was not using technology with students but now using it
- Using technology more frequently with students
- Doing increasing complex activities with students
- Increasingly complex projects possible with help of mentor
- Formerly novice teachers now providing leadership to others

2. With what kind of activities do the technology mentor(s) assist you?

- Help with learning unfamiliar software/hardware
- Help with teaching students to do electronic research effectively
- Help with devising projects to integrate with curricular areas
- Help with online projects or other communications tools

3. Please give one (or more) specific example(s) of how a mentor has helped you to more effectively use technology more effectively with your students.

- Increased confidence and independence in using technology with students
- Students are engaged in using technology in effective ways (more than just drill and practice)
- Students are engaged in problem solving and data management with technology tools
- Participation in effective communication using technology (e.g., email, online discussion groups, online communication projects)
- Increased use and effectiveness in searching and synthesizing electronic information
- Participation and creation of online projects
- Increasingly creative use of technology (e.g., video creation, music, multimedia etc.)

4. What qualities do your mentors possess that make them effective?

- Enthusiastic about technology
- Respected teacher
- Supportive
- Ability to empathize with new learners
- Flexible
- Ability to foster risk-taking
- Vision for technology integration
- Strong interpersonal skills
- Ability to work effectively with adult learners
- Not necessarily a technician or someone who "knows it all"

5. Please comment on how mentoring as a model of professional development is beneficial in comparison to other types of professional development (e.g., workshops, courses, teachers' convention)

- on-site support
- use of own equipment and software
- understanding of student population and school culture
- opportunities for informal mentoring

Conclusion

1. Is there anything else at all that you would like to share with me about your role as a protégé in a technology mentoring program?